

# LONDON- WEST MIDLANDS ENVIRONMENTAL STATEMENT

## Volume 5 | Technical Appendices

CFA10 | Dunsmore, Wendover and Halton

**Survey reports (CH-004-010)**

Cultural heritage

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Department  
for Transport

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# 1 Introduction

## 1.1 Structure of the cultural heritage appendices

- 1.1.1
- The cultural heritage appendices for the Dunsmore, Wendover and Halton community forum area (CFA10) comprise:

  - baseline reports (Volume 5: Appendix CH-001-010);
  - a gazetteer of heritage assets (Volume 5: Appendix CH-002-010);
  - an impact assessment table (Volume 5: Appendix CH-003-010); and
  - survey reports (this appendix).
- 1.1.2
- Maps referred to throughout the cultural heritage appendices are contained in the Volume 5, Cultural Heritage Map Book.
- 1.1.3
- Where appropriate, sites or assets discussed within this report have been cross referenced with the Gazetteer of heritage assets (Volume 5: Appendix CH-002-010) and can be viewed on Maps CH-01-031 to CH-01-034L1 and CH-02-015 to CH-02-016 in the Volume 5, Cultural Heritage Map Book.

## 1.2 Surveys undertaken

- 1.2.1
- This appendix contains the results of a series of archaeological surveys. These surveys comprise:

  - a fully-integrated remote sensing survey incorporating light detection and ranging (LiDAR<sup>1</sup>), hyperspectral imagery and aerial photographic analysis of the majority of the Proposed Scheme;
  - a geophysical survey on land at Wellwick Farm (DWH111), encompassing approximately 24ha; and
  - an archaeological fieldwalking survey on land at Wellwick Farm (DWH111), encompassing approximately 24ha.

## 1.3 Surveys proposed but not undertaken

- 1.3.1
- Access was gained to all of the proposed survey sites in the Dunsmore, Wendover and Halton study area.

# 2 Remote sensing survey report

## 2.1 Introduction

- 2.1.1
- This report outlines the results of the archaeological remote sensing survey of the Dunsmore, Wendover and Halton community forum area. This was an archaeological survey involving the systematic analysis, interpretation, mapping and recording of archaeological sites from aerial photographs, hyperspectral imagery and LiDAR imagery.
- 2.1.2
- The aim was to map and record the form and extent of archaeological features visible as cropmarks, soilmarks, earthworks or structures on a range of different remote sensed imagery for the study area, in order to inform the baseline assessment of the cultural heritage resource. The objective was thereby to facilitate the assessment of impact, and the formulation of mitigation strategies.
- 2.1.3
- The study area has not been covered by an English Heritage national mapping programme project. The Thames Valley national mapping programme project area<sup>2</sup> falls to the south-west and the area covered by the Hertfordshire national mapping programme project<sup>3</sup> lies to the north-east. Therefore there is no existing systematic survey of archaeological features visible on remote sensed sources for the study area.

## The study area

- 2.1.4
- The study area for this remote sensing survey covers the entire length of CFA10, which falls entirely within Buckinghamshire.
- 2.1.5
- The study area generally comprised a 700m-wide strip centred on the route (350m either side of the centre line). This provided a buffer sufficient to offer contextual information for all recorded sites. Where the Proposed Scheme boundary extended beyond the edge of the 700m-wide strip, the study area was expanded to the limit of the remote sensing survey boundary shown in Figures CH-004-10.01 to CH-004-10.06.
- 2.1.6
- At the north-western end of the study area, the boundary of CFA10 doubles back on itself so that a few fields of it appear to nestle within the adjacent Stoke Mandeville and Aylesbury study area (CFA11). These few fields have been included in the CFA10 study area.
- 2.1.7
- In total, the archaeological remote sensing survey for the Dunsmore, Wendover and Halton study area covered an area of 5.6km<sup>2</sup>.

<sup>1</sup> Light detection and ranging (LiDAR) is a high resolution remote sensing technique to capture 3D data.

<sup>2</sup> Fenner, V.E.P., (1994), *The Thames Valley Project: a report for the National Mapping Programme*, RCHME Aerial Survey Report Series.

<sup>3</sup> Fenner, V.E.P., (1992), *Crop Marchks in Hertfordshire: a report for the National Mapping Programme*, RCHME internal document.

2.2 Methodology

2.2.1 In order to provide consistency with other similar datasets (namely English Heritage national mapping programme mapping), the archaeological remote sensing survey was carried out in broad accordance with the current version of the English Heritage national mapping programme standards<sup>4</sup>. The interpretations applied to identified features are consistent with the preferred terms within the English Heritage Monument Type Thesaurus<sup>5</sup>.

Sources: modern aerial photographs

- 2.2.2 High resolution (12.5cm) vertical aerial orthophotography taken specifically for the purposes of the project was made available for this survey. This imagery was captured during 2012. It generally consists of a 700m-wide strip centred on the route, although it is slightly wider in some areas. It was viewed digitally within a geographical information system (GIS) program. The level of accuracy of the orthorectification is such that features mapped from this source should be within 15cm of true ground position.
- 2.2.3 Pre-existing vertical aerial orthophotography dating from the 1990s and 2000s was also made available for this survey. This was supplied under the Pan-Government Agreement. The resolution is 25cm. The level of accuracy of the orthorectification is such that features mapped from this source should be within 1.5m of true ground position<sup>6</sup>. This vertical imagery was also viewed on-screen within GIS.

Sources: historic aerial photographs

- 2.2.4 All readily-available historic vertical and oblique aerial photographs held in archives were also consulted for this project. This included photographs held at the English Heritage Archive (formerly the National Monuments Record) and the Cambridge University Unit for Landscape Modelling. . The latter is also referred to as the Cambridge University Collection of Aerial Photography.
- 2.2.5 The 170 historic vertical aerial photographs of the study area in the English Heritage Archive (Table 5) were taken for non-archaeological purposes between 1943 and 1997, by organisations such as the Royal Air Force (RAF) and the Ordnance Survey (OS). These photographs often captured sites of historic interest incidentally, especially those shots taken in the first half of the 20th century before archaeological remains may have been damaged or destroyed by the intensification of arable farming.
- 2.2.6 The 70 historic oblique aerial photographs of the study area in the English Heritage Archive (Table 6) were taken between 1931 and 2011 and usually targeted known sites of architectural or archaeological interest. They were typically taken at a much larger scale than the 'blanket' vertical aerial photography, and were often timed to capture images of archaeological sites

when they were at their most visible, i.e. when dry ground conditions favoured the development of clear cropmarks, or when low winter sun would reveal subtle earthworks.

- 2.2.7 Twenty-four aerial photographs from the Cambridge University Collection of Aerial Photography fell within the study area (Table 7). These were vertical and oblique aerial photographs dating from between 1949 and 1999. As with the English Heritage aerial photographs the oblique photographs are more likely to have been taken for archaeological purposes than the vertical photographs. The vertical aerial photographs, however, still had the potential to inadvertently capture evidence of archaeological remains.
- 2.2.8 All aerial photographs in the English Heritage and Cambridge University Collection of Aerial Photography archives which fell within the study area were viewed in person and examined stereoscopically and under magnification where applicable. Copies were obtained where potential archaeological features were identified and the relevant photographs were considered to be of use, either for transcription or for reference purposes.

Sources: LiDAR imagery

- 2.2.9 High resolution LiDAR data acquired specifically for the purposes of the project was made available for this survey. This data was captured in 2012. It generally consists of a 700m-wide strip centred on the route, although it is slightly wider in some areas.
- 2.2.10 The resolution of the data supplied was 20cm. The level of accuracy of the orthorectification was such that features mapped from this source should be within 15cm of true ground position. The raster digital elevation model was viewed directly within GIS. The digital elevation model is LiDAR data that has been processed to provide a representation of the ground surface without objects such as vegetation or buildings. This means that archaeological earthworks can be revealed on the LiDAR imagery, even if they lie beneath areas of woodland<sup>7</sup>.

Sources: hyperspectral imagery

- 2.2.11 Hyperspectral imagery taken specifically for the purposes of the project was made available for this survey. This imagery was captured during a series of 'runs' in 2012 and provides a considerable buffer beyond the edge of the remote sensing survey study area boundary<sup>8</sup>.
- 2.2.12 Thirty-four separate spectral band widths were captured, ranging from 406.075 nanometres to 992.065 nanometres. The band widths varied slightly between 16.280 nanometres at the lower end of the spectrum to 18.280 nanometres<sup>9</sup>. For each of the areas surveyed, varying combinations of three different bandwidths were analysed, with particular reference to bands 7–13 (882.725 nanometres to 773.255 nanometres) and bands 18–22 (683.435 nanometres to

<sup>4</sup> Winton, H., (2012) *Standards for National Mapping Programme projects, Version 0.1* Draft, English Heritage, Aerial Investigation and Mapping, Typescript document.

<sup>5</sup> English Heritage, National Monument Record Monument Type Thesaurus; [http://thesaurus.englishheritage.org.uk/thesaurus.asp?thes\\_no=1](http://thesaurus.englishheritage.org.uk/thesaurus.asp?thes_no=1); Accessed: August 2012–June 2013.

<sup>6</sup> GeoStore; Aerial Photography RGB Product; <http://www.geostore.com/geostore4/WebStore?xml=geostore4/xml/productsAPRILGB.xml>; Accessed: August 2013.

<sup>7</sup> This can sometimes depend upon the time of year that the LiDAR imagery was captured.

<sup>8</sup> Hyperspectral runs 2R, 4Ra and 4Rb covered CFA10.

<sup>9</sup> Blom, (2012), *HS2 Hyperspectral Information*, BLOM Project Number: 03/037/12.

612.185 nanometres), as these have been shown previously to be useful in archaeological remote sensing<sup>10</sup>.

2.2.13 The hyperspectral imagery was viewed directly within GIS, as automated classification software does not work well with such high resolution data due to the prolifically varied response obtained from a single small area<sup>11</sup>.

Sources: historic environment record (HER) data

2.2.14 Data from the Buckinghamshire historic environment record (HER) was supplied for the project. These records were used as a reference to aid interpretation of features visible on remote sensed imagery, either through a pre-existing identification of a visible feature, or by providing information that could help characterise the likely cultural heritage resource of the area.

2.2.15 The HER data was supplied as points, lines and polygons, with identifying attribute data attached. Full monument record reports were also supplied as a portable document format document. The data supplied covered the entirety of the Buckinghamshire HER area, creating an ample buffer to provide contextual information for any archaeological sites of interest within the boundary of the remote sensing study area.

Sources: national record of the historic environment data

2.2.16 Monument data from the national record of the historic environment held by English Heritage was supplied for the purposes of the survey. This data was used as a reference to aid interpretation of features visible on remote sensed imagery, either through a pre-existing identification of a visible feature, or by providing information that could help characterise the likely cultural heritage resource of the area.

2.2.17 This data was supplied as points, lines and polygons with identifying attribute data attached. Full monument record reports were also supplied as a portable document format document. The data covered a 10km-wide strip (5km each side of the route centre line) thereby providing an ample buffer beyond the boundary of the remote sensing study area.

Sources: cartographic sources

2.2.18 Historic OS mapping was supplied for the purposes of the survey. The map tiles had been geo-referenced and were viewed digitally in GIS. Epochs 1–4 of the 1:2500 scale County Series maps, which typically date from 1898 onwards, were used as a reference to aid interpretation of features visible on the remote sensed imagery.

2.2.19 In general, where features such as field boundaries, trackways, extractive pits or ponds were marked on a historic OS map, they were not mapped and recorded as part of this survey. This is because the objective of this project was to add to the known record not duplicate it.

Nevertheless, where the full extent or form of a feature was not recorded in its entirety on the historic maps, it was included in the transcription for this project.

Interpretation, rectification and mapping

2.2.20 All vertical and oblique images from the sources identified above were systematically examined for any archaeological features visible as cropmarks, soilmarks, earthworks or structures. In accordance with best practice for remote sensing surveys all available sources for each field or land parcel were viewed in conjunction in order to enable the most accurate interpretation possible.

2.2.21 Where archaeological features were visible on the LiDAR or aerial orthophotography a detailed transcription, including all visible elements of the site in question, was carried out in ArcMap 10.1.

2.2.22 Where additional sites, features or details were visible on the historic aerial photographs from the English Heritage Archive, these images were rectified using the computer program Aerial 5.33 prior to their import into ArcMap for transcription.

2.2.23 Digital OS MasterMap 1:1250 base maps were used to establish control points (it should be noted that even when 1:1250 scale data is obtained the scale of the mapping for rural areas is only in fact 1:2500<sup>12</sup>). Six or more control points were used for each photograph, with errors kept below 1m for each control point. This provided accuracy to within 1m to the base map for the rectified photographs.

2.2.24 A digital terrain model in the form of 5m point data was used in order to further refine the accuracy of the rectifications. The digital terrain model was supplied for the project.

2.2.25 The OS advise that their 1:1250 scale MasterMap data has an accuracy of 0.5m root mean square error for urban areas, and 1.1m root square mean error for rural areas<sup>13</sup>. Therefore, archaeological features transcribed from photographs rectified using this data will on average be accurate to within 1m–2m of their British national grid coordinates.

2.2.26 As already noted, in order to ensure consistency with other similar remote sensing datasets, this project was carried out in broad accordance with current national mapping programme standards and guidance. As such, the identified features were transcribed onto the standard national mapping programme drawing layers, using standard national mapping programme conventions<sup>14</sup> as detailed in Table 1.

Table 1: Layers used in GIS for digital transcription of archaeological features<sup>15</sup>

Layer name	Colour	Description
Bank	Red	Defines the outline of positive features such as boundary banks or windmill mounds. Thin

<sup>10</sup> Powlesland, D., Lyall, J. and Donoghue, D., (1997), *Enhancing the record through remote sensing: the application and integration of multi-sensor, non-invasive remote sensing techniques for the enhancement of the Sites and Monuments Record*, *Internet Archaeology* 2: <http://dx.doi.org/10.1114/1/ia.2.4>; Accessed: 18 December 2012.

<sup>11</sup> Powlesland, D., Lyall, J. and Donoghue, D., (1997).

<sup>12</sup> Ordnance Survey; Products and Services FAQs: How accurate are your products?; <http://www.ordnancesurvey.co.uk/oswebsite/support/products-services.html>; Accessed: June 2013.

<sup>13</sup> Ordnance Survey; Products and Services FAQs: How accurate are your products?; <http://www.ordnancesurvey.co.uk/oswebsite/support/products-services.html>; Accessed: June 2013.

<sup>14</sup> Winton, H., (2012).

<sup>15</sup> Table 1 based on Winton, H., (2012) *Standards for National Mapping Programme project*, Section 7.5. P31.

Layer name	Colour	Description
		banks, or those too diffuse to define accurately are included on this layer as a single line.
Ditch	Green	Defines the outline of negative features such as boundary ditches or hollow ways. Thin ditches, or those too diffuse to define accurately are included on this layer as a single line.
Large cut feature	Blue	Defines the outline of sizeable negative features such as quarries or extractive pits.
Levelled Ridge and furrow outline or direction	Magenta	Defines the outline of a single block of ridge-and-furrow seen either as a cropmark, or an earthwork later known to have been levelled.  An arrow within each single block indicates the direction of ploughing.
Extant Ridge and furrow outline or direction	Cyan	Defines the outline of a single block of ridge-and-furrow seen as earthworks on the latest available remote sensed imagery.  An arrow within each single block indicates the direction of ploughing.
Extent of area	Grey	Defines the extent of large features such as the perimeters of WWII airfields and military camps.
T-hachure	Dark blue	Top of the 'T' defines the top of a slope or scarp edge such as a lynchet or house platform. Body of the 'T' indicates the length and direction of the slope.
Structure	Purple	Defines the extent of surviving buildings and structures such as individual WWII nissen huts and pillboxes. Thin structures such as walls or concrete paths are included in this layer as a single line.

- 2.2.27
- Table 2 and Table 3 show period range and evidence range abbreviations used. The evidence abbreviations identify the form in which a feature is visible on the remote sensed imagery.
- 2.2.28
- Information relating to each of the transcribed features was recorded in the ArcMap attribute table. This included details such as the interpretation of each feature and the remote sensed source they were transcribed from, as well as the HER and national record of the historic environment numbers for the features if applicable. These results have been set out in Table 4 of this report.

Table 2: Period range abbreviations used in the GIS attribute data

Period	Abbreviation	Date range
Neolithic	N	4,000 – 2,400 BC
Bronze Age	BA	2,400 – 700 BC
Iron Age	IA	700 BC – AD 43
Roman	RO	AD 43 – 410
Early medieval	EM	AD 410 – 1066
Medieval	MD	AD 1066 – 1540
Post-medieval	PM	AD 1540 to 1901
20 <sup>th</sup> century/modern	C20	AD 1901 – present
World War II	WWII	1939 to 1945

Period	Abbreviation	Date range
Uncertain	UN	

Table 3: Evidence abbreviations used in the GIS attribute data

Evidence	Abbreviation
Cropmark (includes soilmarks)	C
Earthwork	E
Levelled earthwork	LE
Destroyed monument (i.e. quarried-away)	DM
Structure	S

- 2.2.29
- The results of this remote sensing survey and transcription have been saved in the project ArcMap MXD and have been supplied with all of the additional required metadata attached. The results have also been exported as Esri shapefiles for ease of import into other GIS programs where necessary in compiling the baseline survey.

## 2.3 Limitations

- 2.3.1
- In some areas, the 2012 LiDAR and aerial orthophotography did not cover the full extent of the Proposed Scheme.
- 2.3.2
- Where archaeological sites have been identified solely from remote sensed imagery without confirmation from archaeological excavation or supporting evidence in the form of find-spots etc., it should be noted that the interpretation may be revised in the light of further investigation.
- 2.3.3
- It should be stressed that the absence of an archaeological feature on remote sensed imagery does not confirm its absence in the ground, as visibility from the air is sometimes dependent upon a complex combination of factors. These include:
  - unsuitable conditions at the time of image capture (such as lighting, ground moisture content and crops or other ground cover);
  - variable quality of photography;
  - underlying features being masked by alluvial build-up; and
  - areas where archaeological features either do not survive or have never existed.
- 2.3.4
- During the survey, 'steps' of approximately 2m were noted at several points in the purpose-flown 2012 vertical orthophotography, where adjacent image tiles had been joined to provide continuous coverage of the Proposed Scheme.
- 2.3.5
- Archaeological features were not mapped beyond the boundary of the remote sensing survey study area, as the cumulative effect of this along the entire length of the route would have resulted in a significant increase in the study area. Where archaeological cropmarks,



- earthworks, soilmarks or structures continued beyond the study area boundary, this was noted in the attribute data of the mapped feature.
- 2.3.6 The hyperspectral imagery obtained for the survey did not include spectral bands in the short-wave to mid-infrared/thermal wavelengths (2080 nanometres – 13000 nanometres), which have been shown in the past to be of particular use in assessing archaeological potential. The mid-infrared/thermal range is especially likely to reveal subtle cropmarks or soilmarks that are not strong enough to be detectable in the visible part of the spectrum, due to the fact it will display very slight differences in water content present within both vegetation and the ground<sup>16</sup>.
- 2.3.7 Consultation is on-going with Buckinghamshire HER regarding any possible historic oblique and vertical aerial photographs held in their archive.

2.4 Assumptions

- 2.4.1 Information on the positional accuracy of the hyperspectral imagery has not been supplied. As such it is assumed that the accuracy of the orthorectification of this source is at least as good as that of the Aerial 5.33 program outlined in Section 2.2 of this report - i.e. transcribed features will be accurate to within 1m-2m of true ground position. However, reference should be made to the note in Section 2.3 of this report regarding the 2m 'step' observed in some locations.

2.5 Results: description

- 2.5.1 The primary output of the archaeological remote sensing survey of the study area is the detailed digital transcription of each identified potential archaeological feature. Information pertaining to the interpretation of these features is contained within the attribute data of every line and polygon drawn in GIS.
- 2.5.2 Table 4 itemises in detail the results of the survey. These details originate from the GIS attribute data. The results should be read in conjunction with Figures CH-004-10.01 to CH-004-10.06 of this report.
- 2.5.3 Where a single mapped feature has generated two lines of identical attribute data<sup>17</sup>, the duplicate line has been removed from Table 4. Where the transcription of a site or feature consists of several lines or polygons which may have been visible on different sources, or in a different form (i.e. where different elements of the site are visible as both cropmarks and earthworks), the differing lines of the attribute data table have been retained in order to reflect these variations.
- 2.5.4 The aerial survey ID is the unique identifier applied to each site or feature transcribed during this project. It was not considered sufficient to use the automatically generated 'feature ID' within GIS, as this would result in a site which consisted of several different features

represented by different lines and polygons having several different identifying numbers. The aerial survey ID was also used to group features, such as several interconnecting former field boundaries. This is consistent with the approach taken by English Heritage on national mapping programme projects<sup>18</sup>. The aerial survey ID is prefixed with a different sequential letter for each CFA; for the Dunsmore, Wendover and Halton study area it is the letter 'J'.

- 2.5.5 The national record of the historic environment and HER columns detail the relevant monument numbers for these authorities, where such numbers exist for transcribed features.
- 2.5.6 The period abbreviations used are set out in Table 2.
- 2.5.7 As noted in Section 2.1 of this report, the interpretation types (detailed in the Type column) comply with the preferred terms within the English Heritage Monument Type Thesaurus<sup>19</sup> in order to achieve consistency with other similar transcribed datasets.
- 2.5.8 The evidence abbreviations refer to the physical nature of the recorded features. These abbreviations are set out in Table 3.
- 2.5.9 The remote sensed imagery used to transcribe each individual feature is detailed in the source column.
- 2.5.10 The description column is intended as a brief interpretation only, outlining the main features or points of note.
- 2.5.11 The full attribute table attached to every line and polygon transcribed as part of this survey contains additional columns not displayed in Table 4, such as the date the feature was transcribed and the initials of the member of staff responsible, etc.

<sup>16</sup> Powlesland, D., Lyall, J. and Donoghue, D. (1997).  
<sup>17</sup> Such as a block of ridge and furrow, which contains this information within both the polygon that defines its extent and the line indicating the direction of ploughing.

<sup>18</sup> Winton, H., (2012).  
<sup>19</sup> English Heritage; NMR Monument Type Thesaurus.

Table 4: Exported GIS attribute data for each transcribed feature, detailing the interpretation applied

Aerial Survey ID	National record of the historic environment	HER reference	Period	Type	Evidence	Source	Description
Jo1			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Ridge and furrow is faintly visible as extant earthworks in the field to the west of Hunt's Green Farm. Only mapped up to the edge of the project boundary and LiDAR coverage, though it is likely to continue across the remainder of the field.
							Ridge and furrow is visible as earthworks on LiDAR. Likely to continue to the north-east across the rest of the field, but not mapped beyond the edge of the project boundary and LiDAR coverage.
							Ridge and furrow is visible as extant earthworks on LiDAR.
							Ridge and furrow is visible on LiDAR of 2012 as extant earthworks. Likely to continue eastwards across the remainder of the field, but not mapped beyond the edge of the project boundary and LiDAR coverage.
							Ridge and furrow is visible on LiDAR of 2012 as extant earthworks. Likely to continue eastwards across the remainder of the field, but not mapped beyond the edge of the project boundary and LiDAR coverage. Cut east-west by later ditch.
Jo2			MD / PM	Field boundary / boundary bank	C	Pan-Government Agreement SP8903 23-Aprl-2010 / HS2 Vertical Photography SP8903 2012	A probable former field boundary bank is visible on aerial photographs as a rectilinear cropmark. Not recorded on historic OS maps, although it joins up with one on its eastern side which is.
Jo3 (DWH008)	1066073	0014010000	IA	Linear earthwork	E	HS2 LiDAR 2012	195m stretch of Grim's Ditch visible on LiDAR as earthworks. Cut in several places by possible quarry pits (Jo4). Easternmost linear bank likely to be part of modern field boundary, but contiguous in places with Iron Age earthworks so included in mapping.
Jo4 (DWH008)			PM / UN	Extractive pit	E	HS2 LiDAR 2012	A series of possible extractive pits appear to have been cut into the Iron Age linear earthwork known as Grim's Ditch (Jo3). May alternatively be tree throws. Not recorded on historic OS maps, although a much larger chalk pit is just to the south-east.
Jo5			MD / PM	Field boundary / boundary bank	C	Pan-Government Agreement SP8903 23-April-2010	Several stretches of wide, diffuse, faintly visible linear cropmarks within this field are likely to represent former field boundaries. Identical to, and adjoining, cropmarks of other boundaries within this field which are recorded on historic OS maps.
Jo6			MD / PM	Field boundary / boundary bank	E	HS2 LiDAR 2012	A possible former field boundary bank is visible on LiDAR as a faint linear earthwork beneath trees. The southern end at first appears as an oblong mound, but careful consideration of the LiDAR shows it extends northwards to join another length.
							A possible former field boundary bank is visible on LiDAR as the faintest of linear earthworks. Almost totally levelled. Not recorded on historic OS maps.
Jo7			PM / UN	Extractive pit / quarry	E	HS2 LiDAR 2012	A former quarry is visible on LiDAR as earthworks beneath the trees of a small area of woodland. Not recorded on historic OS maps.
Jo8 (DWH021)		0014011000	IA / MD / UN	Linear earthwork / field boundary	E	HS2 LiDAR 2012	A possible additional stretch of Grim's Ditch recorded in the HER following field survey is also visible on LiDAR beneath the trees of Rushmoor Wood. Interpretation uncertain; further investigation would be required.
Jo9 (DWH030)		0922700000	PM / UN	Extractive pit / quarry	E	HS2 LiDAR 2012	Chalk pit indicated on 1st Edition OS map. Mapped here as this was only a small part of what was visible on the LiDAR. One other large pit within Jones' Hill Wood, as well as five smaller, possibly exploratory, pits (none of these on historic OS maps).
Jo10			MD / PM	Field boundary / boundary bank	E	HS2 LiDAR 2012	A short length of linear bank is visible as an extant earthwork on LiDAR. Likely to be a former field boundary bank as it joins up with other linear banks visible on the LiDAR which have been recorded as such on the historic OS maps.
Jo11			MD / PM	Field boundary / boundary bank	E	HS2 LiDAR 2012	A possible former field boundary bank is visible on LiDAR as an extant linear earthwork between Wendoverdean Farm and Durham Farm. Not recorded on historic OS maps.
Jo12			MD / PM	Field boundary / boundary bank	E	HS2 LiDAR 2012	A possible former field boundary bank is visible on LiDAR as an extant linear earthwork. Not recorded on historic OS maps. Appears to be a south-westerly continuation of a field boundary still in use today.

Aerial Survey ID	National record of the historic environment	HER reference	Period	Type	Evidence	Source	Description
J13			PM / UN	Extractive pit / quarry	E	HS2 LiDAR 2012	A possible former quarry pit is visible on LiDAR beneath trees. A linear bank appears to lead in and out of the pit, on an alignment of south-east to north-west. The purpose of this is unclear; it may be leftover spoil or a later trackway.
J14			PM / UN	Extractive pit / quarry	E	HS2 LiDAR 2012	A possible former quarry is visible on LiDAR as earthworks partly beneath a small area of trees. Not recorded on historic OS maps. Pits look like dolines at first glance, but the presence of a probable spoil heap alongside suggests extractive activity.
				Spoil heap / quarry	E	HS2 LiDAR 2012	A possible former quarry is visible on LiDAR as earthworks partly beneath a small area of trees. Not recorded on historic OS maps. Pits look like dolines at first glance, but the presence of a probable spoil heap alongside suggests extractive activity.
J15			MD / PM / UN	Spoil heap / mound	E	HS2 LiDAR 2012	An oblong mound is visible on LiDAR as an extant earthwork. Purpose/origin uncertain. Possible spoil heap from railway cutting to the west. If so, the furrows that cut it are perhaps not medieval or post-medieval ridge and furrow.
J16			MD / PM	Field boundary / boundary bank	E	HS2 LiDAR 2012	Possible former field boundary is visible on LiDAR as an extant linear earthwork. Not recorded on historic OS maps. Appears to have been cut by ridge and furrow.
J17			MD / PM	Field boundary / boundary bank	E	HS2 LiDAR 2012	A former field boundary bank is visible on LiDAR as an extant linear earthwork. Not recorded on historic OS maps. Appears to be a northwards continuation of the field boundary still in use to the south.
J18			MD / PM	Field boundary / boundary bank	E	HS2 LiDAR 2012	Two possible former field boundary banks are visible on LiDAR as faintly extant linear banks. The westernmost is part recorded on historic OS maps. Appear to be cut by later ridge and furrow. Slope in this field makes the LiDAR difficult to read.
J19 (DWH154)			PM / C20	Water meadow / drainage system	E	HS2 LiDAR 2012	A possible water meadow or later drainage system is visible on LiDAR as an extant network of interconnecting ditches. Not the usual pattern/layout for a water meadow, and there is no visible watercourse linked to the field. Continues to north-east.
J20 (DWH154)			PM / C20	Water meadow / drainage system	E	HS2 LiDAR 2012	A possible extension or continuation of the water meadow or drainage system to the south-east (J19) is visible on LiDAR as an extant network of interconnecting ditches. Not as densely occurring as for feature J19.
J21 (DWH116)	344163 / 344160		MD / PM / UN	Hospital / chantry chapel	C	NMR SP8607-12 NMR 15389-12 15-August-1995 / NMR SP8607-5 NMR 15373 11-August-1995	A complex of linear and rectilinear ditches is visible as cropmarks. Possible robbed-out building foundations, trackways, etc. Record exists for a medieval hospital at this site. Alternatively may be field boundary ditches or other enclosure ditches.
J22			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Possible ridge and furrow is visible as faint earthworks on LiDAR.
J23			MD / PM	Ridge and furrow	E / LE	Cambridge University Collection of Aerial Photography RC8HD201 05-March-1985 / HS2 LiDAR 2012	Levelled ridge and furrow is visible on aerial photographs of 1985 as almost levelled earthworks. Appear to have been completely levelled by the time of the 2012 LiDAR. Also continues across field to the west, but this is beyond the project boundary.
J24 (DWH156)			MD / PM	Ridge and furrow	C	HS2 Hyperspectral 2012 (Run 4a Bands 20, 21, 22)	Levelled ridge and furrow is faintly visible as cropmarks on hyperspectral imagery captured in 2012.
					E / LE	NMR RAF-541-107 3139 26-July-1948 / HS2 LiDAR 2012	Possible ridge and furrow is just visible as earthworks on vertical aerial photographs of 1948. Appears to have been levelled by the time of the 2012 LiDAR.
J25 (DWH156)			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	A small area of ridge and furrow is visible on LiDAR as extant earthworks on the south-eastern side of Wendoverdean Farm
J26 (DWH156)			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	A small area of ridge and furrow is visible as extant earthworks in a triangular field on the northern side of Durham Farm.
J27			MD / PM	Ridge and furrow	C	NMR OS-69254 203 10-June-1969	Levelled ridge and furrow is faintly visible as cropmarks on vertical aerial photographs of 1969.

Aerial Survey ID	National record of the historic environment	HER reference	Period	Type	Evidence	Source	Description
J28			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	An area of possible ridge and furrow is visible on LiDAR as faintly extant earthworks in the field to the east of Rocketeer Cottage. Likely to continue across the rest of the field to the east, but not mapped beyond the project boundary.
J29			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Small area of possible ridge and furrow visible on LiDAR as extant earthworks in the northern end of this field. Likely to continue eastwards, but this is beyond the edge of the both the project boundary and LiDAR coverage and so has not been mapped.
J30			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Possible ridge and furrow is visible on LiDAR as extant earthworks. Appears to cut two other features (J15-16).
J31			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Possible ridge and furrow is very faintly visible on LiDAR as almost completely levelled earthworks.
							Possible ridge and furrow is visible on LiDAR as faintly extant earthworks across this field. Appears to cut two earlier field boundary banks (J18). Steep slopes in this field make the LiDAR difficult to read.
J32			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Possible ridge and furrow is visible on LiDAR as extant earthworks across the playing fields to the west of Wellhead Farm.
J33			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Ridge and furrow is just visible on LiDAR as faint earthworks across the field between Bacombe Hill and Wendover. Later field boundaries and trackways are visible over the top of it and are recorded on historic OS maps.
J34 (DWH124)			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Almost levelled ridge and furrow is just visible as faint earthworks on LiDAR across several fields on the north-western side of Wendover.
							Ridge and furrow is just visible on 2012 LiDAR as almost levelled earthworks across a series of small subdivided fields and paddocks to the north of Coneycroft Farm. Clearly visible on 1954 vertical aerial photographs.
						NMR RAF-540-1269 0054 12-March-1954 / HS2 LiDAR 2012	Ridge and furrow is just visible on 2012 LiDAR as almost levelled earthworks across a series of small subdivided fields and paddocks to the north of Coneycroft Farm. Clearly visible on 1954 vertical aerial photographs.
					E / LE	Cambridge University Collection of Aerial Photography RC8HE112 05-March-1985 / HS2 LiDAR 2012	Ridge and furrow in the north-western end of this field is visible on aerial photographs of 1985 as faintly extant earthworks. By the time of the LiDAR of 2012 this end appears to have been levelled whereas the rest of the field is still faintly extant.
						NMR RAF-541-272 4219 21-June-1949 / HS2 LiDAR 2012	Possible ridge and furrow is just visible as earthworks on vertical aerial photographs of 1949. Appears to have been levelled by the time of the 2012 LiDAR.
J35			MD / PM	Ridge and furrow	E / LE	Cambridge University Collection of Aerial Photography RC8HE112 05-March-1985 / HS2 LiDAR 2012	Ridge and furrow in the north-western end of this field is visible on aerial photographs of 1985 as faintly extant earthworks. By the time of the LiDAR of 2012 this end appears to have been levelled, whereas the rest of the field is still faintly extant.
					E	HS2 LiDAR 2012	Almost levelled ridge and furrow is just visible as faint earthworks on LiDAR across several fields on the north-western side of Wendover.
							Possible ridge and furrow is visible on LiDAR as extant earthworks.
J36			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	A small fragment of surviving ridge and furrow is visible as earthworks in back gardens between the road and the railway line.
J37			MD / PM	Ridge and furrow	C	Pan-Government Agreement SP8508 13-June-2003	Levelled ridge and furrow is visible as cropmarks in the field to the south-east of The Hollies.
J38 (DWH153)			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	A small area of extant ridge and furrow is visible on LiDAR as earthworks across two paddocks or small fields.
							Two well-preserved areas of ridge and furrow are clearly visible on LiDAR as extant earthworks.



Aerial Survey ID	National record of the historic environment	HER reference	Period	Type	Evidence	Source	Description
					C	Pan-Government Agreement SP8408 13-June-2003	Levelled ridge and furrow is visible as cropmarks on several different alignments across this single large modern field. 2012 LiDAR confirms that it is no longer extant.
						Pan-Government Agreement SP8408 13-June-2003 / Cambridge University Collection of Aerial Photography RC8HE112 05-March-1985	Levelled ridge and furrow is visible as cropmarks on several different alignments across this single large modern field. 2012 LiDAR confirms that it is no longer extant.
					E / LE	Pan-Government Agreement SP8508 23-April-2010 / HS2 LiDAR 2012	A small area of ridge and furrow is visible as earthworks on vertical aerial photographs of 2010. Appears to have been levelled by the time of the 2012 LiDAR. Ditch on eastern side is marked as a field boundary on the 1st Edition OS map.
J39 (DWH143 and DWH132)			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Almost levelled ridge and furrow is visible on LiDAR as faintly extant earthworks across several fields. Can see they would have originally formed one continuous block. Two areas just to the south-west which would have also been contiguous and not so levelled.
							Well-preserved ridge and furrow is clearly visible on LiDAR as extant earthworks to the south-east and north-east of the riverside cottage. Can see it would have continued into the field to the east, where it is now almost completely levelled.
							Well-preserved ridge and furrow is visible on LiDAR as extant earthworks. Bisected by what appears to be water erosion perhaps caused by the alteration of the path of a stream.
					C	Pan-Government Agreement SP8409 23-April-2010	Possible ridge and furrow is faintly visible as cropmarks in a small area in the corner of this large modern field. Coincides with an area defined by former field boundaries, as recorded on the historic OS maps.
					E / LE	Pan-Government Agreement SP8409 23-April-2010 / HS2 LiDAR 2012	Ridge and furrow that is visible as earthworks on vertical aerial photographs of 2010 appears to have been levelled by the time of the 2012 LiDAR.
J40			MD / PM	Ridge and furrow	E / LE	Pan-Government Agreement SP8409 23-April-2010 / HS2 LiDAR 2012	Ridge and furrow that is visible as earthworks on vertical aerial photographs of 2010 appears to have been levelled by the time of the 2012 LiDAR. Continues to the north across the rest of the field, but not mapped beyond the project boundary.
J41			MD / PM	Field boundary / boundary bank	E	HS2 LiDAR 2012	A former field boundary is visible as a linear bank on LiDAR. Not recorded on historic OS maps.
J42 (DWH117)		0220500000	MD / PM / UN	Motte and bailey / spoil heap	E	HS2 LiDAR 2012	Possible medieval motte and bailey site visible as almost levelled earthworks. Low, oval-shaped, flat mound between the taller possible motte mound (west) and the possible outer ditch (east) may be the plough-spread remains of the outer bailey bank.
							Possible medieval motte and bailey site visible on LiDAR as almost levelled earthworks. LiDAR image confused by later plough furrows. May alternatively be a series of spoil heaps from excavation of the lake on the south-eastern side of the field.
							Possible medieval motte and bailey site visible on LiDAR as almost levelled earthworks. Part of a possible outer bailey ditch is most visible on eastern side. LiDAR image greatly confused by later plough furrows in two different directions.
							Possible medieval motte and bailey site visible on LiDAR as almost levelled earthworks. Possible oval-shaped motte mound on western side, with small circular earthwork feature on top. LiDAR image confused by plough furrows in two different directions.
J43			MD / PM	Ridge and furrow	E	Pan-Government Agreement SP8209 13-	Extant ridge and furrow is visible on aerial photographs in the corner of this field. The photographs show that it continues across the remainder of this field, but it has not been mapped beyond the edge of the project boundary.

Aerial Survey ID	National record of the historic environment	HER reference	Period	Type	Evidence	Source	Description
						June-2003	
J44			MD / PM	Ridge and furrow	E	Pan-Government Agreement SP8309 13-June-2003 / HS2 LiDAR 2012	Ridge and furrow is visible on vertical aerial photographs as cropmarks. The 2012 LiDAR shows it is also just slightly extant.
J45			MD / PM	Ridge and furrow	C	Pan-Government Agreement SP8309 13-June-2003	Ridge and furrow is faintly visible as cropmarks on vertical aerial photographs. Continues across the rest of the field to the south-west, but not mapped beyond the project boundary.
					E	Pan-Government Agreement SP8309 13-June-2003 / HS2 LiDAR 2012	Ridge and furrow is visible on vertical aerial photographs as cropmarks. The 2012 LiDAR shows it is also just slightly extant. Continues to the south-west, but not mapped beyond the project boundary.
J46			MD / PM	Ridge and furrow	E	HS2 Vertical Photography SP8209 2012	A tiny patch of ridge and furrow is visible on aerial photographs as earthworks within the northernmost corner of this field. The photographs show it continues across the remainder of the field, but it has not been mapped beyond the project boundary.

## 2.6 Results: interpretation

- 2.6.1 Forty-six possible archaeological features were recorded from the remote sensed imagery that was surveyed as part of this project.
- 2.6.2 A short section of an Iron Age linear earthwork was visible on LiDAR as a substantial ditch and bank beneath trees to the north-east of Three Bears (feature Jo3 (DWH008), scheduled monument 1021198). This section is one of several referred to as the Grim's Ditch. The banks on either side of the ditch appear to extend slightly beyond the scheduling polygon in places. It is possible this may be the result of confusion created by later field boundary banks adjoining the earlier earthwork. This feature continues south-westwards into the Central Chilterns study area (CFA9), where it is recorded as I82.
- 2.6.3 The survey recorded several large hollows (Jo4) visible along the length of this section of Grim's Ditch, which cut into the outer banks as well as the edge of the ditch itself in places. These may be natural features such as tree-throws, or the result of small-scale quarrying activity. These pits are not recorded on the modern or historic OS maps.
- 2.6.4 There is a further possible section of the Grim's Ditch approximately 430m to the north of the previously-recorded stretch. It is visible as ditch and bank earthworks on LiDAR, beneath the trees of Rushmoor Wood. This is recorded in the Buckinghamshire HER as a possible part of the Iron Age territorial boundary.
- 2.6.5 The survey recorded a possible medieval motte and bailey site (J42, DWH117) in a sports field on the southern side of Wendover. An HER record indicated this possibility based on an observation from aerial photographs. Later field survey shed doubt on this interpretation. The indistinct earthworks just visible on LiDAR may well support this theory however.
- 2.6.6 There appears to be a large oval mound on the western side of the site which may represent the motte. The eastern side of the area of earthworks is demarcated by a shallow curvilinear ditch, which may have been the outer bailey ditch. The large sub-oval flat-topped mound between these two features may represent the interior of the bailey with a formerly substantial outer bailey bank ploughed flat across the top of it. All of these earthwork features are diffuse in appearance, and in order for the field to be in use as a recreation ground, must be extremely subtle in appearance at ground level.
- 2.6.7 Alternatively it is possible that the earthworks represent spoil heaps from excavation of the lake just to the south-east. If there were prior defensive earthworks at this site then any such dumping would severely confuse the interpretation of possible medieval remains. The earthworks, however, may be related solely to the construction of the lake. The plough marks visible in two different directions over the top of the entire site may be either later agricultural activity or an attempt to level the recreation ground.
- 2.6.8 The survey recorded a complex of cropmarks (J21, DWH116) in the field between Bacombe Hill and Wendover, on the south-western side of the town. These may just represent former field and plot boundaries. There are two national record of the historic environment records, however, at this point indicating the site of the medieval hospital and chantry chapel of St John the Baptist. The actual location of the former medieval remains does not seem particularly certain as it appears to be based solely on documentary evidence. It raises the

possibility though that these rectilinear ditch cropmarks may be robbed-out structural remains of the former medieval site.

- 2.6.9 Some areas of extant and flattened ridge and furrow dating to the medieval or early post-medieval periods were recorded from the remote sensed imagery. Ridge and furrow in the study area, however, was nowhere near as densely apparent as for some of the more northerly study areas (such as the Waddesdon and Quainton study area (CFA12)).
- 2.6.10 The survey also recorded the earthwork remains of a number of former field boundaries and possible plough headlands. Most of these are likely to be medieval or post-medieval in date. As noted in Section 2.2, former field boundaries already recorded on historic OS maps were not transcribed here.
- 2.6.11 An interconnecting network of drainage ditches that spans several fields on the north-western side of Wendover may be the extant remains of a post-medieval water meadow (J19, DWH154). The layout of the ditches does not conform to the pattern typically seen for a water meadow and it is not immediately adjacent to a waterway, so this interpretation is uncertain. Some of the ditches appear to be continuous with the furrows of the adjacent area of ridge and furrow (J35, DWH124). The south-western side appears to have been cut by the construction of the railway which may have obliterated evidence of the feeder channel if indeed this was a water meadow.
- 2.6.12 The high resolution of the LiDAR imagery revealed the prolific occurrence of dolines, or solution holes/hollows, across the southern third of CFA10. Dolines are common on chalk bedrocks<sup>20,21</sup> such as that of the survey area<sup>22</sup>. Dolines can appear similar to the remains of former quarrying activity, but in this instance the overwhelming frequency of their occurrence indicated that these features were likely to be of natural origin.
- 2.6.13 The survey also recorded what appeared to be genuine evidence of past extractive industry (features Jo7, Jo9 (DWH030), J14). These extractive features were jagged and irregularly shaped and sometimes had accompanying spoil heaps, differentiating them from the smooth circular or oval dolines. It is not unknown for dolines to be worked as chalk pits,<sup>23</sup> and it is possible that this may have been the origin of some of the former quarries mapped here.

## 2.7 Conclusions

- 2.7.1 Forty-six individual or grouped possible archaeological features were identified by the survey, 41 of which are not recorded by either the HER or national record of the historic environment. These features include:
- a section of the Iron Age linear earthwork known as Grim's Ditch (scheduled monument 1021198), as well as a further possible un-scheduled stretch to the north;
  - earthwork remains of what has been tentatively interpreted as an almost ploughed-

<sup>20</sup> Wilson, D., (2000), *Air Photo Interpretation for Archaeologists*, Tempus Publishing Ltd, Stroud, P168-9.

<sup>21</sup> Natural Environment Research Council (NERC), (2006), *Geology of the Salisbury Sheet Area*, British Geological Society, Onshore Geology Series, Internal Report IR/06/011, P212.

<sup>22</sup> British Geological Survey, (2012), *Digital Geological Map of Great Britain (DiGMapGB-10) at 1:10 000 scale, for bedrock geology and superficial deposits*, Digital Data Licence No. 2012/062.

<sup>23</sup> NERC, (2006), P215.

out former motte and bailey site;

- cropmarks which may indicate the site of a former medieval hospital and chapel;
- areas of extant and levelled ridge and furrow;
- medieval and post-medieval field boundary earthworks;
- a possible post-medieval water meadow which survives as a network of extant ditches; and
- areas of probable post-medieval quarrying.

2.8 References

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2.9 Historic aerial photographs consulted

Table 5: English Heritage vertical aerial photographs consulted for the remote sensing survey of CFA10

English Heritage library number	Original sortie number	Original frame number	Date taken
21	RAF/106G/UK/717	4044	26 August 1945
21	RAF/106G/UK/717	4045	26 August 1945
21	RAF/106G/UK/717	4046	26 August 1945
21	RAF/106G/UK/717	4047	26 August 1945
21	RAF/106G/UK/717	4048	26 August 1945
21	RAF/106G/UK/717	4049	26 August 1945
21	RAF/106G/UK/717	4079	26 August 1945
21	RAF/106G/UK/717	4080	26 August 1945
21	RAF/106G/UK/717	4081	26 August 1945
21	RAF/106G/UK/717	4082	26 August 1945
21	RAF/106G/UK/717	4083	26 August 1945
21	RAF/106G/UK/717	4084	26 August 1945
21	RAF/106G/UK/717	4085	26 August 1945
21	RAF/106G/UK/717	4086	26 August 1945
21	RAF/106G/UK/717	4087	26 August 1945
21	RAF/106G/UK/717	4088	26 August 1945
795	RAF/CPE/UK/2483	3342	10 March 1948
795	RAF/CPE/UK/2483	3343	10 March 1948
915	RAF/541/107	3139	26 July 1948
915	RAF/541/107	3140	26 July 1948
915	RAF/541/107	3141	26 July 1948
915	RAF/541/107	3148	26 July 1948
915	RAF/541/107	3149	26 July 1948
1061	RAF/541/479	3310	07 April 1950
1061	RAF/541/479	3311	07 April 1950
1061	RAF/541/479	3312	07 April 1950
1061	RAF/541/479	3331	07 April 1950
1061	RAF/541/479	3332	07 April 1950
1061	RAF/541/479	3333	07 April 1950
1061	RAF/541/479	3350	07 April 1950

English Heritage library number	Original sortie number	Original frame number	Date taken
1061	RAF/541/479	3351	07 April 1950
1061	RAF/541/479	3352	07 April 1950
1061	RAF/541/479	4291	07 April 1950
1061	RAF/541/479	4312	07 April 1950
1061	RAF/541/479	4313	07 April 1950
1061	RAF/541/479	4314	07 April 1950
1061	RAF/541/479	4315	07 April 1950
1061	RAF/541/479	4334	07 April 1950
1061	RAF/541/479	4335	07 April 1950
1061	RAF/541/479	4336	07 April 1950
1061	RAF/541/479	4337	07 April 1950
1171	RAF/58/649	3026	23 April 1951
1171	RAF/58/649	3027	23 April 1951
1171	RAF/58/649	3028	23 April 1951
1511	RAF/540/1269	52	12 March 1954
1511	RAF/540/1269	53	12 March 1954
1511	RAF/540/1269	54	12 March 1954
1511	RAF/540/1269	55	12 March 1954
1511	RAF/540/1269	56	12 March 1954
1522	RAF/82/895	354	08 April 1954
1522	RAF/82/895	355	08 April 1954
1522	RAF/82/895	356	08 April 1954
1555	RAF/82/995	75	26 August 1954
1555	RAF/82/995	76	26 August 1954
2144	RAF/58/4655	23	30 August 1961
2144	RAF/58/4655	24	30 August 1961
2144	RAF/58/4655	25	30 August 1961
2195	RAF/58/4627	460	16 August 1961
2195	RAF/58/4627	461	16 August 1961
2195	RAF/58/4627	461	16 August 1961
2195	RAF/58/4627	462	16 August 1961
2195	RAF/58/4627	462	16 August 1961

English Heritage library number	Original sortie number	Original frame number	Date taken
2195	RAF/58/4627	463	16 August 1961
2195	RAF/58/4627	464	16 August 1961
2661	RAF/541/340	3323	26 July 1949
2661	RAF/541/340	3324	26 July 1949
2661	RAF/541/340	3325	26 July 1949
2661	RAF/541/340	3326	26 July 1949
2661	RAF/541/340	3366	26 July 1949
2661	RAF/541/340	3367	26 July 1949
2661	RAF/541/340	4324	26 July 1949
2661	RAF/541/340	4325	26 July 1949
2661	RAF/541/340	4326	26 July 1949
2661	RAF/541/340	4367	26 July 1949
2661	RAF/541/340	4368	26 July 1949
2670	RAF/541/272	4218	21 June 1949
2670	RAF/541/272	4219	21 June 1949
2670	RAF/541/272	4220	21 June 1949
2670	RAF/541/272	4221	21 June 1949
3560	RAF/106G/UK/683	4049	23 August 1945
3560	RAF/106G/UK/683	4050	23 August 1945
3560	RAF/106G/UK/683	4051	23 August 1945
3560	RAF/106G/UK/683	4052	23 August 1945
3560	RAF/106G/UK/683	4053	23 August 1945
8672	RAF/AC289	5058	08 March 1943
8672	RAF/AC289	5059	08 March 1943
8672	RAF/AC289	5060	08 March 1943
8672	RAF/AC289	5064	08 March 1943
8672	RAF/AC289	5065	08 March 1943
8672	RAF/AC289	5066	08 March 1943
10212	OS/71344	570	15 July 1971
10212	OS/71344	571	15 July 1971
10212	OS/71344	572	15 July 1971
10212	OS/71344	573	15 July 1971

English Heritage library number	Original sortie number	Original frame number	Date taken
10212	OS/71344	613	15 July 1971
10212	OS/71344	614	15 July 1971
10212	OS/71344	615	15 July 1971
10212	OS/71344	616	15 July 1971
10212	OS/71344	617	15 July 1971
10212	OS/71344	643	15 July 1971
10212	OS/71344	644	15 July 1971
10212	OS/71344	645	15 July 1971
10212	OS/71344	646	15 July 1971
10213	OS/71383	685	15 July 1971
10213	OS/71383	686	15 July 1971
10213	OS/71383	687	15 July 1971
10213	OS/71383	709	15 July 1971
10213	OS/71383	710	15 July 1971
10213	OS/71383	711	15 July 1971
10451	OS/72145	22	23 May 1972
10451	OS/72145	23	23 May 1972
11638	OS/69254	129	10 June 1969
11638	OS/69254	130	10 June 1969
11638	OS/69254	131	10 June 1969
11638	OS/69254	154	10 June 1969
11638	OS/69254	155	10 June 1969
11638	OS/69254	156	10 June 1969
11638	OS/69254	157	10 June 1969
11638	OS/69254	166	10 June 1969
11638	OS/69254	167	10 June 1969
11638	OS/69254	168	10 June 1969
11638	OS/69254	179	10 June 1969
11638	OS/69254	180	10 June 1969
11638	OS/69254	202	10 June 1969
11638	OS/69254	203	10 June 1969
11638	OS/69254	211	10 June 1969

English Heritage library number	Original sortie number	Original frame number	Date taken
11638	OS/69254	212	10 June 1969
11638	OS/69254	213	10 June 1969
11639	OS/69255	252	10 June 1969
11639	OS/69255	253	10 June 1969
11639	OS/69255	254	10 June 1969
14767	OS/94535	81	18 October 1994
14767	OS/94535	82	18 October 1994
14767	OS/94535	117	18 October 1994
14767	OS/94535	118	18 October 1994
14767	OS/94535	119	18 October 1994
14767	OS/94535	144	18 October 1994
14767	OS/94535	145	18 October 1994
14767	OS/94535	146	18 October 1994
14767	OS/94535	185	18 October 1994
14767	OS/94535	186	18 October 1994
14767	OS/94535	187	18 October 1994
14768	OS/94536	207	18 October 1994
14768	OS/94536	208	18 October 1994
15399	RAF/58/8419	10	14 November 1967
15399	RAF/58/8419	11	14 November 1967
15399	RAF/58/8419	12	14 November 1967
15399	RAF/58/8419	13	14 November 1967
15399	RAF/58/8419	14	14 November 1967
15399	RAF/58/8419	35	14 November 1967
15399	RAF/58/8419	36	14 November 1967
15399	RAF/58/8419	37	14 November 1967
15399	RAF/58/8419	39	14 November 1967
15399	RAF/58/8419	63	14 November 1967
15399	RAF/58/8419	64	14 November 1967
15632	RAF/58/2213	10	18 July 1957
15632	RAF/58/2213	11	18 July 1957
15632	RAF/58/2213	19	18 July 1957

English Heritage library number	Original sortie number	Original frame number	Date taken
15632	RAF/58/2213	20	18 July 1957
40300	EA/AF/97C/705	1420	01 April 1997
40300	EA/AF/97C/705	1421	01 April 1997
40300	EA/AF/97C/705	1422	01 April 1997
40300	EA/AF/97C/705	1423	01 April 1997
40300	EA/AF/97C/705	1424	01 April 1997
40303	EA/AF/97C/708	2913	01 April 1997
40303	EA/AF/97C/708	2914	01 April 1997
40303	EA/AF/97C/708	2915	01 April 1997
40303	EA/AF/97C/708	2916	01 April 1997
40303	EA/AF/97C/708	2917	01 April 1997
40303	EA/AF/97C/708	2918	01 April 1997

Table 6: English Heritage oblique aerial photographs consulted for the remote sensing survey of CFA10

English Heritage photo reference	Film number	Original frame number	Date taken
SP 8308 / 15	NMR 26691	/ 14	09 July 2010
SP 8308 / 16	NMR 26691	/ 15	09 July 2010
SP 8308 / 17	NMR 26691	/ 16	09 July 2010
SP 8308 / 18	NMR 26691	/ 17	09 July 2010
SP 8308 / 19	NMR 26691	/ 18	09 July 2010
SP 8308 / 20	NMR 26691	/ 19	09 July 2010
SP 8308 / 21	NMR 26691	/ 20	09 July 2010
SP 8308 / 22	NMR 26691	/ 21	09 July 2010
SP 8308 / 23	NMR 26691	/ 22	09 July 2010
SP 8309 / 1	NMR 2198	/ 064	06 February 1985
SP 8309 / 2	NMR 2198	/ 070	06 February 1985
SP 8309 / 3	NMR 2198	/ 065	06 February 1985
SP 8309 / 4	NMR 2198	/ 066	06 February 1985
SP 8309 / 5	NMR 2198	/ 067	06 February 1985
SP 8309 / 6	NMR 2198	/ 068	06 February 1985
SP 8309 / 7	NMR 2198	/ 069	06 February 1985

English Heritage photo reference	Film number	Original frame number	Date taken
SP 8309 / 8	NMR 2198	/ 071	06 February 1985
SP 8309 / 9	NMR 2198	/ 072	06 February 1985
SP 8309 / 10	NMR 2198	/ 073	06 February 1985
SP 8309 / 11	NMR 2198	/ 074	06 February 1985
SP 8309 / 12	NMR 2198	/ 075	06 February 1985
SP 8309 / 13	NMR 2198	/ 076	06 February 1985
SP 8309 / 14	NMR 2198	/ 077	06 February 1985
SP 8309 / 15	NMR 2198	/ 078	06 February 1985
SP 8309 / 16	NMR 2198	/ 079	06 February 1985
SP 8309 / 17	NMR 2198	/ 080	06 February 1985
SP 8309 / 18	NMR 2198	/ 081	06 February 1985
SP 8309 / 19	NMR 2198	/ 082	06 February 1985
SP 8309 / 20	NMR 2198	/ 083	06 February 1985
SP 8408 / 1	NMR 26691	/ 23	09 July 2010
SP 8408 / 2	NMR 26691	/ 24	09 July 2010
SP 8607 / 1	CAP 8260	/ 14	13 April 1955
SP 8607 / 2	CAP 8260	/ 15	13 April 1955
SP 8607 / 3	CAP 8260	/ 16	13 April 1955
SP 8607 / 4	CAP 8260	/ 17	13 April 1955
SP 8607 / 5	NMR 15373	/ 19	11 August 1995
SP 8607 / 6	NMR 15365	/ 01	11 August 1995
SP 8607 / 7	NMR 15365	/ 02	11 August 1995
SP 8607 / 8	NMR 15365	/ 03	11 August 1995
SP 8607 / 9	NMR 15365	/ 04	11 August 1995
SP 8607 / 10	NMR 15375	/ 24	15 August 1995
SP 8607 / 11	NMR 15375	/ 25	15 August 1995
SP 8607 / 12	NMR 15389	/ 12	15 August 1995
SP 8607 / 13	NMR 15389	/ 13	15 August 1995
SP 8607 / 14	NMR 15389	/ 14	15 August 1995
SP 8607 / 15	AFL 60768	/ EPW036319	August 1931
SP 8608 / 1	AFL 60768	/ EPW036322	August 1931
SP 8608 / 2	AFL 60768	/ EPW036324	August 1931

English Heritage photo reference	Film number	Original frame number	Date taken
SP 8706 / 1	NMR 26962	/ 21	01 June 2011
SP 8707 / 6	AFL 60768	/ EPW036321	August 1931
SP 8707 / 7	AFL 60768	/ EPW036323	August 1931
SP 8803 / 1	NMR 26962	/ 27	01 June 2011
SP 8903 / 1	NMR 24564	/ 16	16 March 2007
SP 8903 / 2	NMR 24564	/ 17	16 March 2007
SP 8903 / 3	NMR 24564	/ 18	16 March 2007
SP 8903 / 4	NMR 24564	/ 19	16 March 2007
SP 8903 / 5	NMR 24564	/ 20	16 March 2007
SP 8903 / 6	NMR 24564	/ 21	16 March 2007
SP 8903 / 7	NMR 24564	/ 22	16 March 2007
SP 8903 / 8	NMR 24564	/ 23	16 March 2007
SP 8903 / 9	NMR 26962	/ 22	01 June 2011
SP 8903 / 10	NMR 26962	/ 23	01 June 2011
SP 8903 / 11	NMR 26962	/ 24	01 June 2011
SP 8903 / 12	NMR 26962	/ 25	01 June 2011
SP 8903 / 13	NMR 26962	/ 26	01 June 2011
SP 8903 / 14	NMR 26962	/ 28	01 June 2011
SP 8904 / 1	NMR 26694	/ 13	09 July 2010
SP 8904 / 2	NMR 26694	/ 14	09 July 2010
SP 8904 / 3	NMR 26694	/ 15	09 July 2010
SP 8904 / 4	NMR 26694	/ 16	09 July 2010

Table 7: Cambridge University Collection of Aerial Photography aerial photographs consulted for the remote sensing survey of CFA10

Cambridge University Collection of Aerial Photography catalogue number	Date taken	Type
CA164	09/04/1949	Oblique
CAW58	02/08/1976	Oblique
ER37	28/07/1949	Oblique
ER38	28/07/1949	Oblique
PL14	13/04/1955	Oblique
PL15	13/04/1955	Oblique

Cambridge University Collection of Aerial Photography catalogue number	Date taken	Type
PL16	13/04/1955	Oblique
PL17	13/04/1955	Oblique
RC8HD154	05/03/1985	Vertical
RC8HD201	05/03/1985	Vertical
RC8HD203	05/03/1985	Vertical
RC8HD204	05/03/1985	Vertical
RC8HE050	05/03/1985	Vertical
RC8HE051	05/03/1985	Vertical
RC8HE111	05/03/1985	Vertical
RC8HE112	05/03/1985	Vertical
RC8HE202	05/03/1985	Vertical
RC8HE203	05/03/1985	Vertical
RC8IR075	24/07/1986	Vertical
RC8IR088	24/07/1986	Vertical
RC8IR089	24/07/1986	Vertical
YB43	09/06/1959	Oblique
ZknlC225	15/06/1999	Vertical
ZknlC225	16/06/1999	Vertical

## 2.10 Figures

CH-004-10.01	Remote sensing survey interpretation	1:5,000
CH-004-10.02	Remote sensing survey interpretation	1:5,000
CH-004-10.03	Remote sensing survey interpretation	1:5,000
CH-004-10.04	Remote sensing survey interpretation	1:5,000
CH-004-10.05	Remote sensing survey interpretation	1:5,000
CH-004-10.06	Remote sensing survey interpretation	1:5,000



## 3 Geophysical surveys

### 3.1 Site CSoAA: Land at Wellwick Farm (DWH111)

#### Introduction

- 3.1.1 A geophysical survey was conducted over a predefined area on land at Wellwick Farm, north-west of Wendover, Buckinghamshire (centred DWH111; national grid reference: SP 8567 0831; Figure CH-004-10.07). The aim of the survey was to locate and characterise any anomalies of possible archaeological interest within the survey site.

#### The site

- 3.1.2 The survey site lies to the south-west of the A413, approximately 0.4km outside of Wendover, Buckinghamshire. The study area was divided across two fields and measured a total of approximately 24ha. The fieldwork was carried out between the 30 June and the 6 July 2013. The site was under a short wheat crop (measuring approximately 12 inches in height) during the fieldwork.
- 3.1.3 The site is situated on bedrock of the West Melbury Marly Chalk Formation and Zig Zag Chalk Formation (undifferentiated). There are no superficial deposits recorded<sup>24</sup>. The soils in the area are known as Grove which are typical gleyic brown calcareous earth soils. These consist of moderately permeable fine loamy calcareous soils over silty gravel affected by groundwater (SSEW: Sheet 6 South East England)<sup>25</sup>.

#### Summary archaeological/historic background

- 3.1.4 The following information is summarised from the records of the Buckinghamshire County HER.
- 3.1.5 A Romano-British cremation burial was excavated at Wellwick Farm to the immediate south-west of the survey site.
- 3.1.6 Prehistoric worked flints have been discovered in the area of the site, as have Iron Age and Roman artefacts and Saxon pottery and metalwork. The site has high potential for archaeological remains from these eras.

#### Methodology

- 3.1.7 The survey was carried out in line with current English Heritage guidelines<sup>26</sup> and a written scheme of investigation<sup>27</sup>. All survey grid positioning was carried out using Trimble R8 Real Time Kinematic VRSNow equipment. The geophysical survey area was georeferenced relative to the Ordnance Survey National Grid by tying in to local detail and corrected to the mapping.

These tie-ins are presented in Figure CH-004-10.07. Please refer to this diagram when re-establishing the grid or positioning trenches.

- 3.1.8 The magnetometer survey was carried out with Bartington Grad 601-2 fluxgate gradiometers, collecting data every 0.25m along traverses 1m apart. Data processing has been performed as appropriate using an in-house software package employing the following processing steps: Destripe (removes striping effects caused by zero point discrepancies between different sensors and walking directions) and Destagger (removes zig-zag effects caused by inconsistent walking speeds on sloping, uneven or overgrown terrain).
- 3.1.9 The presentation of the data for each site includes a print-out of the minimally processed data both as a greyscale plot and as a colour plot showing extreme magnetic values (Figures CH-004-10.08 and CH-004-10.09).

#### Limitations

- 3.1.10 Magnetic survey is an exceedingly effective technique for site evaluation, providing fast data acquisition and responding, to some degree, to the majority of archaeological site types. The technique relies upon anthropogenic enhancement of naturally occurring iron-bearing compounds in the soil. Detection rates can be poor where archaeological sites have seen only temporary and/or sporadic occupation, or where there is insufficient activity to drive the enhancement (this is often true of lithic-era sites). Success may also be limited over soils that are deficient in iron compounds, providing little material to be subject to enhancement. Conversely the strength of response from soils and geological units which are naturally magnetic (for example igneous formations and soils derived thereof) may mask any subtler archaeological enhancement within.
- 3.1.11 The presence of ferrous structures either above or below ground (buildings, pylons, fences, pipes, etc.) will produce very strong magnetic fields which will extend far beyond their physical footprint. The strength of these magnetic 'shadows' is such that they may mask practically any adjacent archaeological anomalies. Similarly, later features and demolition spreads or imported consolidation material can produce areas of magnetic disturbance that will mask underlying features.
- 3.1.12 As a general rule the Bartington Grad601 instruments allow for a depth of investigation of approximately 1m, depending on the strength of the field produced by the buried feature. Below this depth, only particularly enhanced material will be detected with any degree of confidence.
- 3.1.13 The general conditions for the surveyed field were good, with only a short crop *in-situ* during the fieldwork.

#### Assumptions

- 3.1.14 All of the fields contain small-scale ferrous anomalies, most clearly represented by sharp 'spikes' in the colour plots. These are typically assumed to be modern debris within the topsoil unless the site type or prior knowledge suggests otherwise.

#### Results: description

- 3.1.15 The gradiometer data collected across the Wellwick Farm site has identified several positive linear responses indicative of former cut features (see Figure CH-004-10.10). Two of these

<sup>24</sup> British Geological Survey, Geology of Britain Viewer; <http://www.bgs.ac.uk/opengeoscience/home.html?Accordion1=1#maps>.

<sup>25</sup> Soil Survey of England and Wales, (1983), *Soils of England and Wales, Sheet 6: South East England*.

<sup>26</sup> English Heritage, (2008), *Geophysical Survey in Archaeological Field Evaluation*, English Heritage, Portsmouth.

<sup>27</sup> Cotswold Archaeology, (2013), *HS2 Buckinghamshire: Written Scheme of Investigation for Geophysical and Metal Detecting Surveys*.

- responses are particularly rectilinear in form and are classified as of probable archaeological origin.
- 3.1.16 A cluster of discrete positive anomalies identified in the south-eastern part of the site are indicative of former cut features such as pits.
- 3.1.17 High amplitude responses indicative of magnetic disturbance are seen around the field boundaries and surrounding the telegraph poles. Also noted are several dipolar responses indicative of magnetic 'spikes' associated with ferrous materials.
- 3.1.18 In the centre of the survey area a series of linear responses are indicative of field drains.

Results: interpretation

- 3.1.19 The gradiometer data collected from the Wellwick Farm site has identified two rectilinear responses, one in the north-western part of the site and one in the southern part (see Figure CH-004-10.10). These responses are indicative of former cut features and are in a form suggestive of former field boundaries or enclosure features.
- 3.1.20 Additional positive linear and curvilinear anomalies are noted across the site and may also be of archaeological interest, although these anomalies are less distinct in character. A cluster of discrete positive responses noted in the south-eastern part of the site may indicate in-filled pits of possible archaeological interest, although these anomalies may also be of a natural origin.
- 3.1.21 Modern activity on the site is evident through areas of magnetic disturbance associated with the modern field boundaries, magnetic spikes indicative of ferrous objects and a series of field drains seen in the centre of the survey area.

Conclusions

- 3.1.22 Two rectilinear responses of probable archaeological origin have been identified in the Wellwick Farm data set and are possibly associated with former field boundaries or enclosures.
- 3.1.23 Further linear and discrete responses which may be of archaeological interest are also identified, but these anomalies are less distinct in character and may be natural in origin.

3.2 References

British Geological Survey, Geology of Britain Viewer;  
<http://www.bgs.ac.uk/opengeoscience/home.html?Accordion1=1#maps>.

Cotswold Archaeology, (2013), *HS2 Buckinghamshire: Written Scheme of Investigation for Geophysical and Metal Detecting Surveys*.

English Heritage, (2008), *Geophysical Survey in Archaeological Field Evaluation*, English Heritage, Portsmouth.

Soil Survey of England and Wales, (1983), *Soils of England and Wales, Sheet 6: South East England*

3.3 Figures

CH-004-10.07	Site location plan and survey area & referencing	1:1500
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CH-004-10.08	Colour plot of minimally processed gradiometer data	1:1250
CH-004-10.09	Plot of minimally processed gradiometer data	1:1250
CH-004-10.10	Abstraction and interpretation of gradiometer anomalies	1:1250

# 4 Fieldwalking surveys

## 4.1 Site CSoAA: land at Wellwick Farm (DWH111)

### Introduction

- 4.1.1
- On 26–27 March 2013 an archaeological fieldwalking survey was carried out on land at Wellwck Farm, Buckinghamshire (DWH111; centred on national grid reference : SP 8567 0831; Figure CH-004-10.11). The objective of the survey was to provide further information on the archaeological potential of the survey site.
- 4.1.2
- The fieldwalking survey was undertaken in accordance with a written scheme of investigation and guidance issued by the Institute for Archaeologists<sup>28</sup> and English Heritage<sup>29</sup>.

### The site

- 4.1.3
- The survey site lies some 0.4km west of Wendover, on the western side of the A413. The site is approximately 100m north-east of the main Wellwick Farm complex (Figure CH-004-10.11).
- 4.1.4
- The site encloses approximately 24ha. At the time of the survey it comprised a series of recently-ploughed agricultural fields, with boundaries marked by hedgelines and modern fencing. The site lies on generally flat ground, sloping gently to the south.
- 4.1.5
- The bedrock geology in the main body of the site is recorded as Zig Zag and West Melbury Marly Chalk Formations. The bedrock geology in the north-western end of the site is recorded as mudstones, siltstones and sandstones of the Gault Formation and Upper Greensand Formation mudstone. These bedrocks formed approximately 94–112 million years ago (the Cretaceous Period) in shallow seas<sup>30</sup>.
- 4.1.6
- The site’s superficial deposits are not recorded<sup>31</sup>.

### Summary archaeological/historic background

- 4.1.7
- The following information is summarised from the records of the Buckinghamshire HER.
- 4.1.8
- Prehistoric worked flints have been discovered in the region of the site, as have Iron Age, Roman and Saxon artefacts. A human cremation burial dating to the Roman period was excavated at Wellwick Farm to the immediate south-west of the site.

### Methodology

- 4.1.9
- The fields within the survey site were numbered 1–3 (Figure CH-004-10.12). A series of transects was established within the individual fields using a Leica Smart Rover GPS. These transects were tied in to the OS grid and were assigned alphabetic identifiers.

- field 1 contained six transects (A–F), spaced at 20m intervals;
  - field 2 contained thirteen transects (A, C, E, G, I, K, M, O, Q, S, U, V, W), which were mainly spaced at 40m intervals, although transects U–W lay at 20m intervals; and
  - field 3 contained four transects (A–D), spaced at 20m intervals.
- 4.1.10
- The fieldwalking team walked the length of these transects. A 2m-wide corridor centred on each individual transect was observed as a basis for artefact collection.
- 4.1.11
- The length of each transect was sub-divided into a series of 20m stints. Artefacts recovered from each individual stint were bagged together.
- 4.1.12
- There was provision for artefacts considered by the survey team to be of special archaeological interest to be located individually using a Leica Smart Rover GPS. No such artefacts were recovered, however.
- 4.1.13
- There was also provision for detailed fieldwalking at a greater resolution in areas where find concentrations were noted. It was decided in the field, however, that there was no need for such intensification of survey.
- 4.1.14
- All artefacts were collected, with the exception of any materials positively identified as modern. Any large concentrations of certain materials such as stone, slag and tile were sampled only.

### Limitations

- 4.1.15
- The site was in agricultural use and had been ploughed recently, creating excellent survey conditions. There was some light snow coverage approximately 20% of the ground surface), but this was not felt to have impeded artefact identification significantly.
- 4.1.16
- Due to access constraints, stints within field 2 were established at 40m intervals, rather than the 20m intervals specified in the written scheme of investigation<sup>32</sup>.

### Assumptions

- 4.1.17
- There is a general assumption that surface concentrations of artefactual material overlie and originate from below-ground archaeological remains. It should be noted, however, that processes such as manuring and ploughing can spread artefacts over a wide area and as such surface artefacts may not always denote the presence of archaeological sites. Nevertheless, it is considered that the greater the concentration of artefacts, the less likely it is to have been redeposited by such processes.

<sup>28</sup> Institute for Archaeologists, (2008), *Standard and Guidance for Archaeological Field Evaluation*.

<sup>29</sup> English Heritage , (1991), *Management of Archaeological Projects 2*; *English Heritage (2006) Management of Research Projects in the Historic Environment (MoRPHE): Project Manager’s Guide*, English Heritage, Swindon.

<sup>30</sup> British Geological Survey Geology of Britain Viewer; [http://maps.bgs.ac.uk/geology\\_viewer\\_google/googleviewer.html](http://maps.bgs.ac.uk/geology_viewer_google/googleviewer.html); Accessed: 28 February 2013

<sup>31</sup> British Geological Survey Geology of Britain Viewer.

<sup>32</sup> Cotswold Archaeology, (2013), *HS2 Buckinghamshire: Written Scheme of Investigation for an Archaeological Fieldwalking Survey*.

4.1.18 It is often assumed that the higher the quantity of recovered artefacts, the more extensive the corresponding below-ground archaeological remains. The converse of this is that if no (or only very limited) artefacts are recovered, then it is assumed that there are no below-ground archaeological remains at the survey site. It should be noted, however, that different types of archaeological sites produce different quantities of artefactual material: for example, a medieval site may be associated with considerably more artefacts than an early prehistoric site, and a settlement site may produce more material than a ritual site which saw activity only during festivals. The limitations of fieldwalking surveys (see Section 4.1.15) should also be borne in mind: the amount of artefacts recovered can be dependent upon a number of environmental and land use factors.

Results: description

4.1.19 The following provides a brief description of each of the main periods/categories of recovered artefacts. A detailed discussion on the finds begins in Section 4.1.30 of this report. The artefact distributions are depicted on Figures CH-004-10.12 to CH004.10.14.

Prehistoric (pre-AD 43): worked flint and pottery (Figure CH-004-10.12)

4.1.20 An assemblage of 13 worked flints was recovered. Most of these were not closely dateable, although three blade-like flakes may date to the Mesolithic or Early Neolithic (c. 10,000–3,000 BC).

4.1.21 Five pottery sherds of probable Early to Middle Iron Age date (c. 700–100 BC) were retrieved from field 2.

4.1.22 The prehistoric artefacts exhibited a general tendency towards the southern part of the site, although there were outliers within field 3 and the northern end of field 2.

Roman (AD 43–410): pottery and building material (Figure CH-004-10.13)

4.1.23 A total of 112 sherds of Roman pottery was recovered from the site. There was a Late Roman (c. AD 200–410) emphasis to this material.

4.1.24 A total of 1,547g of Roman brick and tile was retrieved during the survey. Where this material was identifiable, it consisted of flanged or curved roofing tiles.

4.1.25 The Roman artefacts displayed a clear concentration along the south-eastern edge of field 2, with only a very limited scatter of material coming from the remainder of the site.

Medieval (AD 1066–1539): pottery (Figure CH-004-10.14)

4.1.26 Ten sherds of pottery dating from the 12th–14th centuries were recovered from the site. These were spread over fields 1 and 2, although a small cluster was apparent towards the north-western corner of field 1/south-western corner of field 2.

Post-medieval/modern (AD 1540–present): pottery and building material (Figure CH-004-10.14)

4.1.27 Thirty-six sherds of post-medieval/modern pottery were retrieved. These were mainly of a type in use from circa1550 until the early 19th century.

4.1.28 A total of 2,305g of post-medieval/modern ceramic building material (CBM) was recovered, mainly comprising flat tiles of a type produced across the 17th, 18th and 19th centuries.

4.1.29 The post-medieval/modern artefacts were distributed fairly widely throughout the site although there was a general weighting towards the south and east.

The finds

4.1.30 The following is a detailed report on the artefactual material recovered from the site during the fieldwalking survey.

4.1.31 The surface-collected finds were recorded directly to a Microsoft Access database and their positions (Field/Transect/stint) were plotted using ARCVIEW GIS software. All pottery was quantified by sherd count and weight according to period, and a note was made of fabrics or vessel forms where discernible. Prehistoric worked flint was quantified by count and class (flakes/cores/tools) and ceramic building material was recorded by period, group and weight. The finds are discussed according to period and category.

Prehistoric worked flint

4.1.32 A small group of worked flint comprising 13 pieces was recorded. Raw material consists of grey or dark grey/black flint, none of which is patinated. As is typical for a surface-collected group, the worked flint exhibits moderate or high levels of breakage and/or edge damage. The group includes a single piece with secondary working; an end/side scraper, from F2/A/80. The remainder consists of flakes or blades without secondary working or clear indications of utilisation. Blade-like removals (including broken pieces) were identified from F1/B/60, F2/A/120 and F2/V/0. These may be indicative of Mesolithic or earlier Neolithic activity. The remainder, including the scraper, are not able to be dated.

4.1.33 The lithics group exhibits a general tendency to the southern part of the survey area, with nine pieces recorded from field 1 and the southern portion of field 2. The group is, however, small and unlikely to indicate intensive (earlier) prehistoric activity in the immediate area.

Late prehistoric pottery

4.1.34 In total, five sherds of late prehistoric pottery (59g) were recovered, all from field 2. All consist of bodysherds in handmade sandy, fossil shell-tempered or quartz/flint-tempered fabrics. None was decorated. Broad earlier to Middle Iron Age date is suggested for the group based on the fabrics. The late prehistoric sherds occur for the most part on the same axis as that noted for the Roman assemblage (below). As such, they may indicate a pre-Roman origin to this activity. A large sherd (weighing 31g) in a shelly fabric from F2/M/40 is an outlier.



*Romano-British pottery*

- 4.1.35
- A total of 112 sherds (8,78g) of Romano-British pottery were recorded, all but two sherds coming from field 2. Typically for a surface collection, the Romano-British pottery exhibits moderate to severe abrasion.
- 4.1.36
- Most of the represented types are local or regional in origin. Continental finewares are completely absent although there is a single amphora sherd of Baetican amphora (south Spanish type). The abundance of Oxfordshire red slipped and whitewares is a good indication of the Late Roman emphasis to the group. Red-slipped wares can all be expected to date after circa AD 240. A bowl sherd with impressed rosette decoration (F2/W/20) certainly dates to the mid/late 4th century.
- 4.1.37
- The distribution of the Romano-British pottery (and CBM, below) is remarkably linear in its character, extending along an axis, corresponding to field 2 transects U–W. The site of a Roman cremation burial is known at Wellwick Farm, to the south-west of the survey area, and the distribution may relate to a trackway or roadside settlement associated with this site.

*Romano-British CBM*

- 4.1.38
- Romano-British brick/tile amounts to 1,547g, recorded almost in its entirety from field 2. The majority comprises unfeatured fragments where identification rests on fabric and thickness. Material identifiable to class is restricted to flanged (tegula) or curved (imbrex) roofing tiles. Observation of brick/tile fabric indicates that most material occurs in a moderately hard, orange-firing fabric. Fragments of tile in a shelly fabric were noted from five stints (F2/U/160 and 180; F2/V/100; F2/V/140 and F2/W/0). The shelly fabric probably originates from the north Bedfordshire manufacturing site at Harrold<sup>33</sup>, which was active mainly in the later Roman period.
- 4.1.39
- The distribution of this material demonstrates the same, very marked, linearity as the Roman-British pottery and is further suggestive of activity relating to a trackway or similar. The weight values across the survey area are relatively uniform and are generally reflective of moderately high levels of fragmentation, there being no apparent spatial tendencies along the length of the linear spread.

*Medieval pottery*

- 4.1.40
- A total of 10 sherds of medieval pottery (74g) was recorded. All material comprises bodysherds, mainly in unglazed sandy or limestone/chalk-tempered coarseware fabrics. One sherd in an oxidised glazed jug fabric was recorded from F2/V/20. The medieval pottery is broadly attributable to the 12th to 14th centuries, with a likelihood that the glazed jug sherd dates after c.1200. The group is moderately widely dispersed, although there is a small cluster of four sherds in the north-western portion of field 1 and the adjoining area of field 2.

*Post-medieval/modern pottery*

- 4.1.41
- A total of 36 sherds (440g) of post-medieval and later pottery was recorded. Almost all consists of sherds of internally-glazed red earthenwares, utilitarian pottery common to the period after c.1550/1600 and continuing in use into the early 19th century. Other types present include English stoneware and unglazed red earthenware ('flowerpot') for which a 19th century or later date can be expected. The distribution of this material demonstrates generalised tendencies across the survey area.

*Post-medieval CBM*

- 4.1.42
- CBM of post-medieval type amounts to 2,305g and was recorded from 68 grid squares. Most abundant are fragments of flat tile, characteristically occurring in a hard red orange sandy fabric typical of material produced across the 17th to 19th centuries. The distribution for this class of material is relatively widely dispersed across the survey area, though with a weighting broadly across the eastern boundaries and field 1.

**Results: interpretation**

- 4.1.43
- The small assemblage of prehistoric worked flints and pottery recovered during the survey exhibited a general tendency towards the southern part of the site but is unlikely to indicate intensive prehistoric activity.
- 4.1.44
- The Romano-British artefacts displayed a clear, linear concentration along the south-eastern edge of field 2. The north-east/south-western alignment of this linear concentration may indicate a trackway running towards Wellwick Farm, where a Roman cremation burial was excavated (see Section 4.1.7). The small quantities of Early to Middle Iron Age pottery recovered from this area of the site may suggest a pre-Roman origin for this putative trackway.
- 4.1.45
- The recovered quantity of medieval pottery is small and is unlikely to be representative of significant activity during this period.
- 4.1.46
- The post-medieval material recovered from the site was fairly widespread, and was probably deposited during field manuring, or through the dumping of material to improve drainage or traction.

**Conclusions**

- 4.1.47
- A clear, linear concentration of Romano-British artefacts was recorded along the south-eastern edge of field 2. This might indicate the line of a trackway running towards Wellwick Farm, a known Romano-British site. Small quantities of Early to Middle Iron Age pottery recovered from this area of the site might suggest a pre-Roman origin for this trackway.

**4.2 References**

British Geological Survey Geology of Britain Viewer; [http://maps.bgs.ac.uk/geology\\_viewer\\_google/googleviewer.html](http://maps.bgs.ac.uk/geology_viewer_google/googleviewer.html); Accessed: 28 February 2013.

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<sup>33</sup> Brown, A., (1994), *A Romano-British shell-tempered pottery and tile manufacturing site at Harrold, Bedfordshire*, Bedfordshire Archaeology Journal 21, P19-107.

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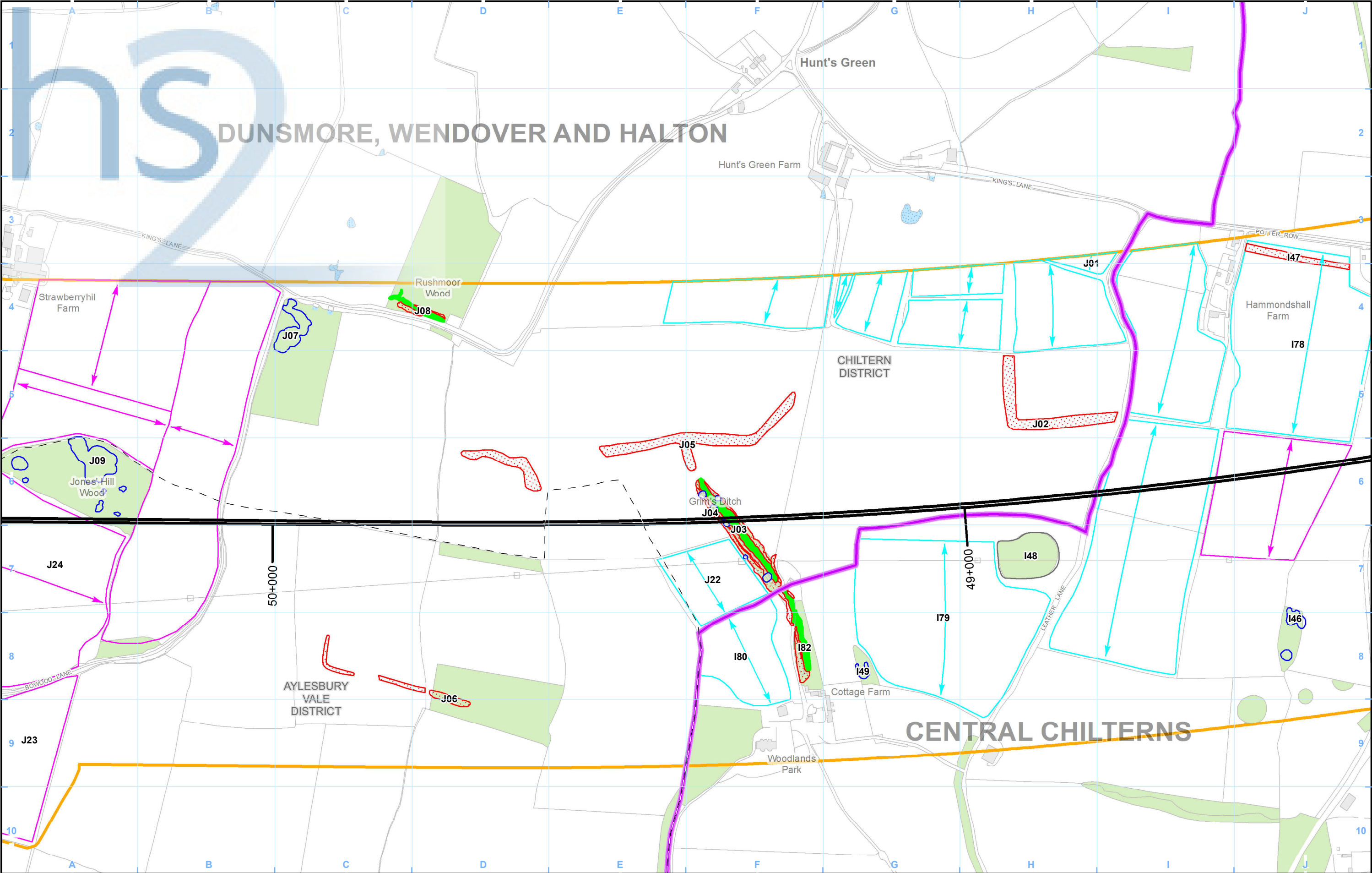
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4.3 **Figures**

CH-004-10.11	CSoAA: Site location plan	1:25,000
CH-004-10.12	CSoAA: Prehistoric finds	1:3,000
CH-004-10.13	CSoAA: Roman finds	1:3,000
CH-004-10.14	CSoAA: Medieval and post-medieval finds	1:3,000



**Legend**

Route in tunnel

Route on surface

Community forum boundary

District/Borough boundary

Watercourse

Water body

Woodland

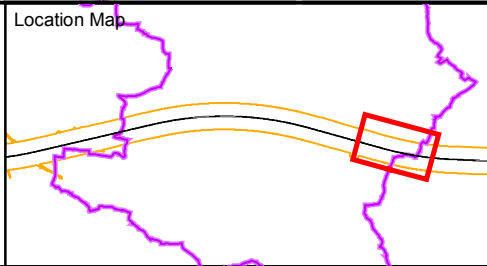
Remote sensing survey boundary

Archaeological features

- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

Extent of Area

- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature



Map Number

CH-004-10.01

Map Name

Remote Sensing Survey Interpretation

Community Forum Area CFA10:  
Dunsmore, Wendover & Halton

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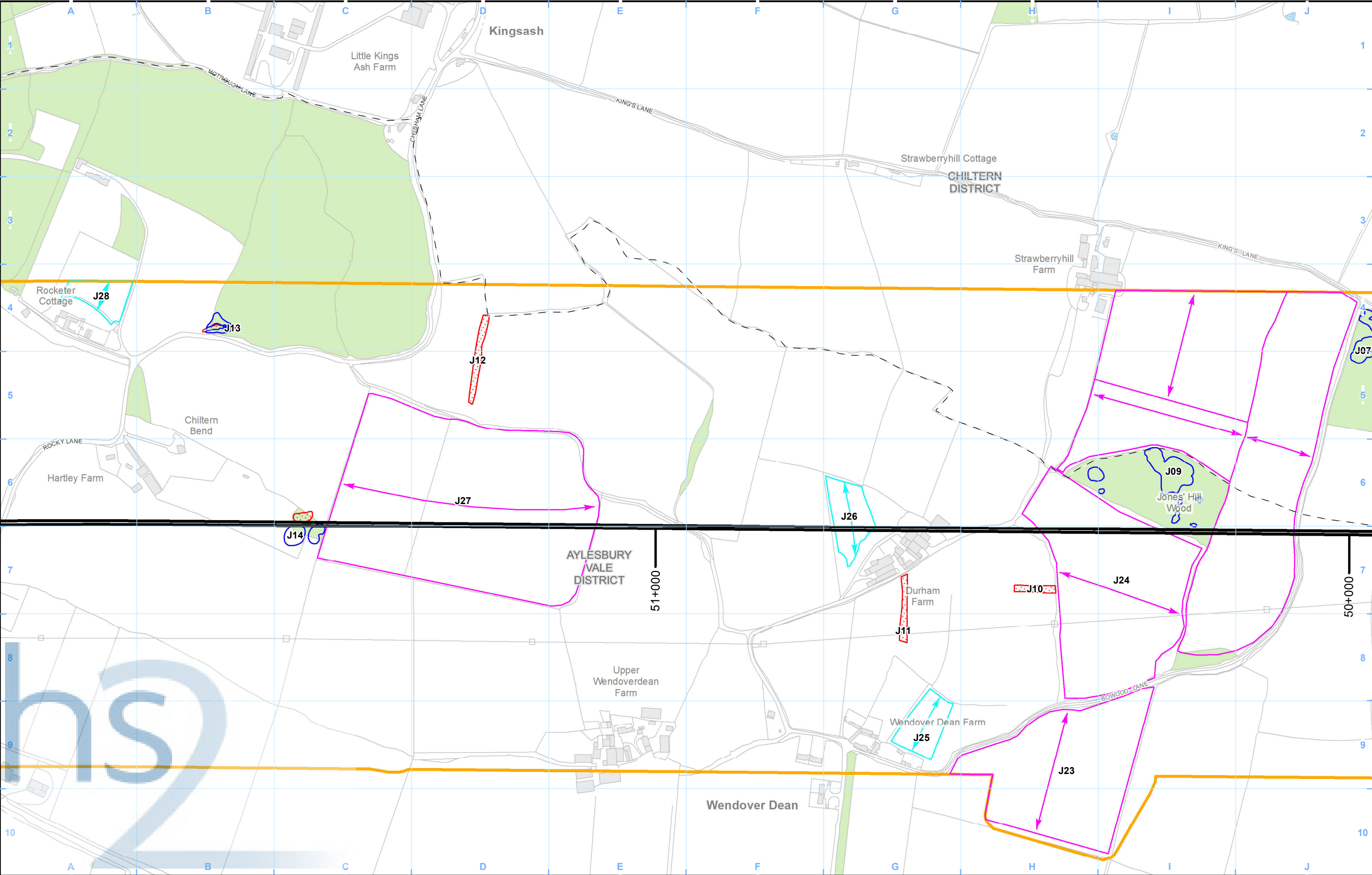
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**Legend**

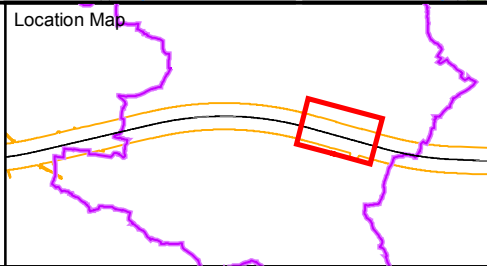
- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland

**Remote sensing survey boundary**

- Archaeological features
  - Bank
  - Ditch
  - Extant ridge and furrow direction
  - Levelled ridge and furrow direction
  - Structure
  - T-Hachure

**Extent of Area**

- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature



**Map Number**

CH-004-10.02

**Map Name**

Remote Sensing Survey Interpretation

Community Forum Area CFA10:  
Dunsmore, Wendover & Halton

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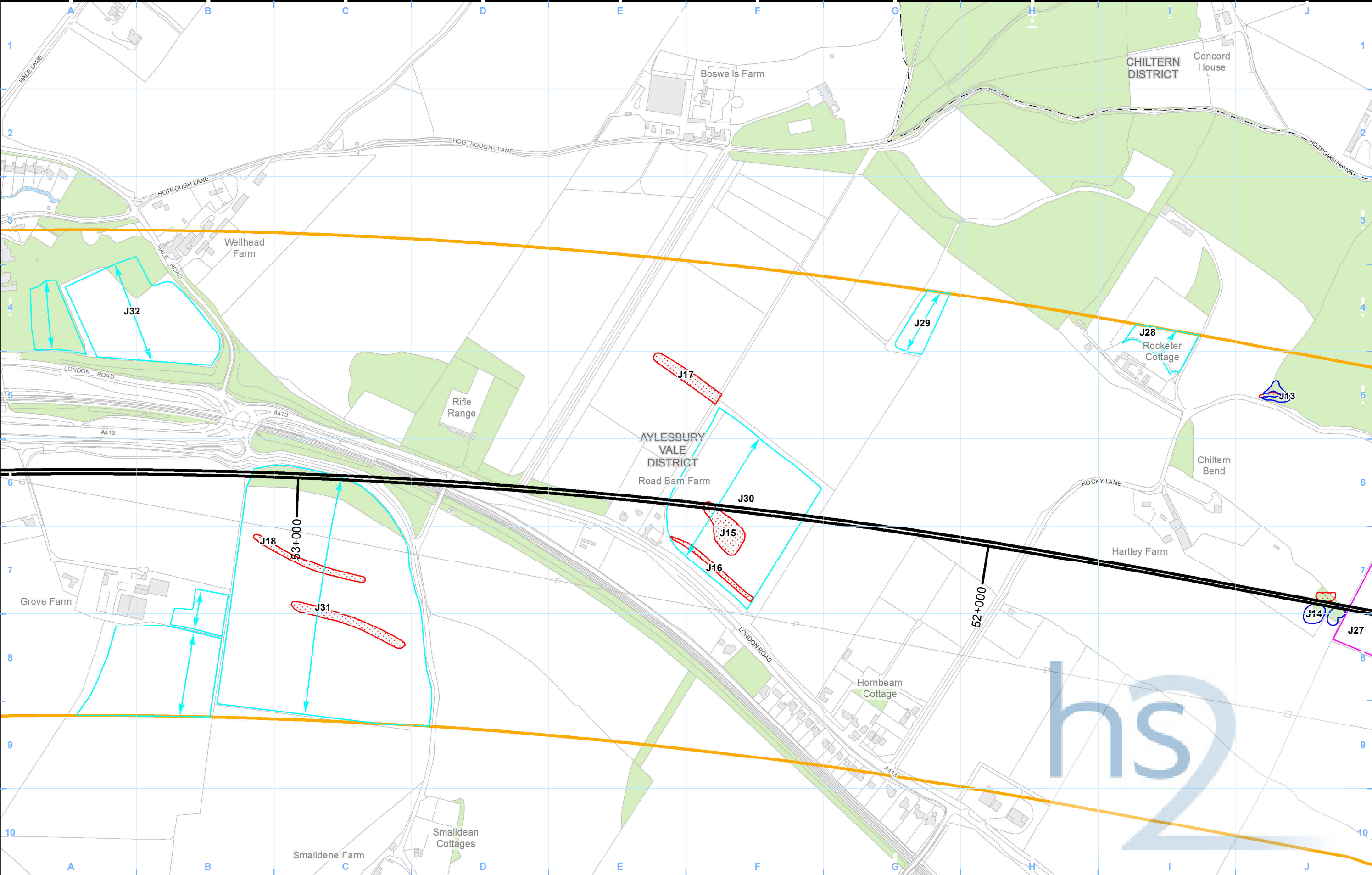
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**Legend**

Route in tunnel

Route on surface

Community forum boundary

District/Borough boundary

Watercourse

Water body

Woodland

Remote sensing survey boundary

Archaeological features

Bank

Ditch

Extant ridge and furrow direction

Levelled ridge and furrow direction

Structure

T-Hachure

Extent of Area

Bank

Ditch

Extant ridge and furrow outline

Levelled ridge and furrow outline

Structure

Large cut feature

Location Map

Map Number

CH-004-10.03

Map Name

Remote Sensing Survey Interpretation

Community Forum Area CFA10:  
Dunsmore, Wendover & Halton

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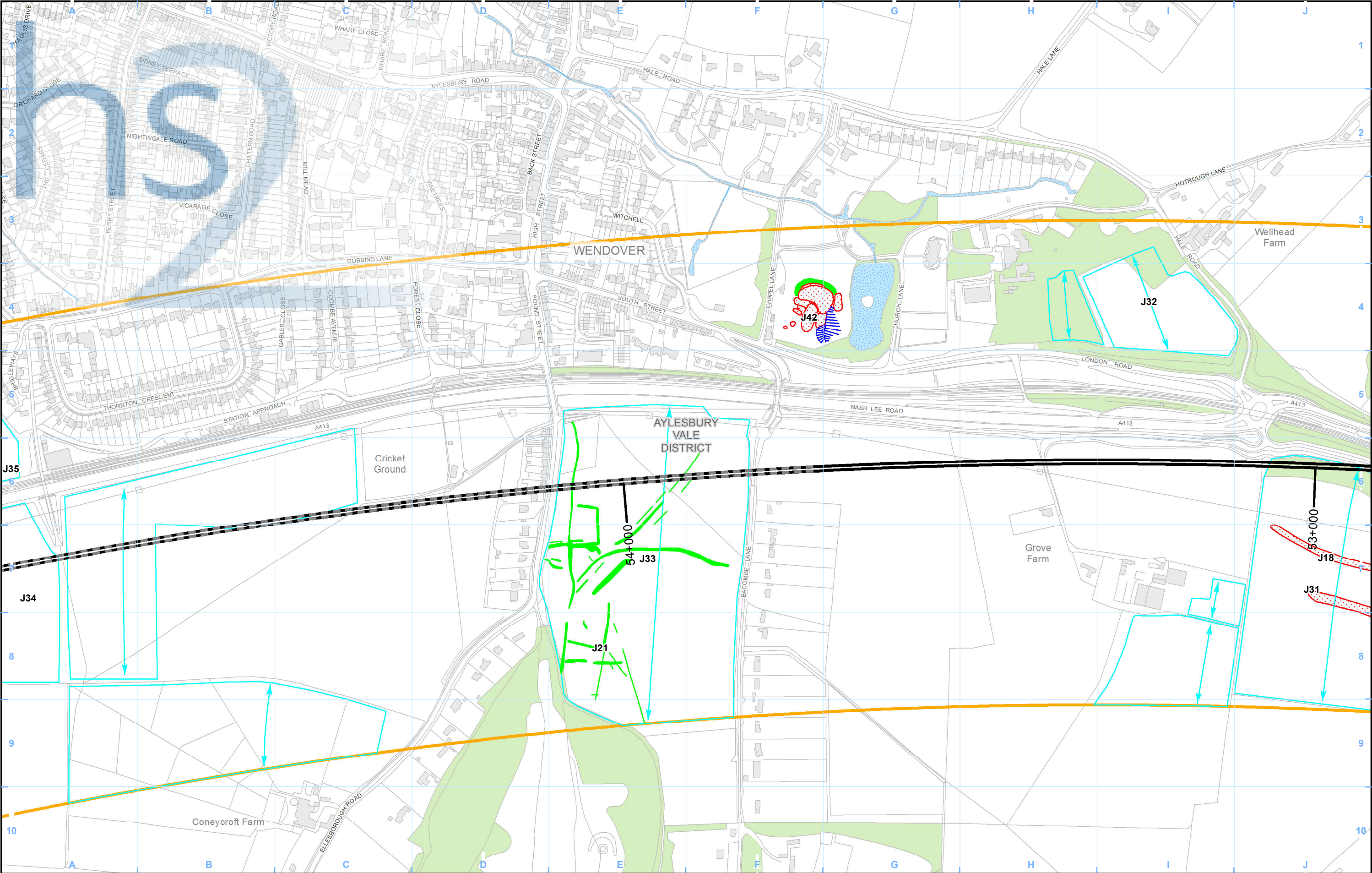
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**Legend**

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland

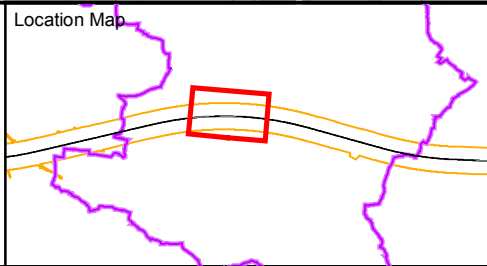
**Remote sensing survey boundary**

**Archaeological features**

- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

**Extent of Area**

- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature



**Map Number**

CH-004-10.04

**Map Name**

Remote Sensing Survey Interpretation

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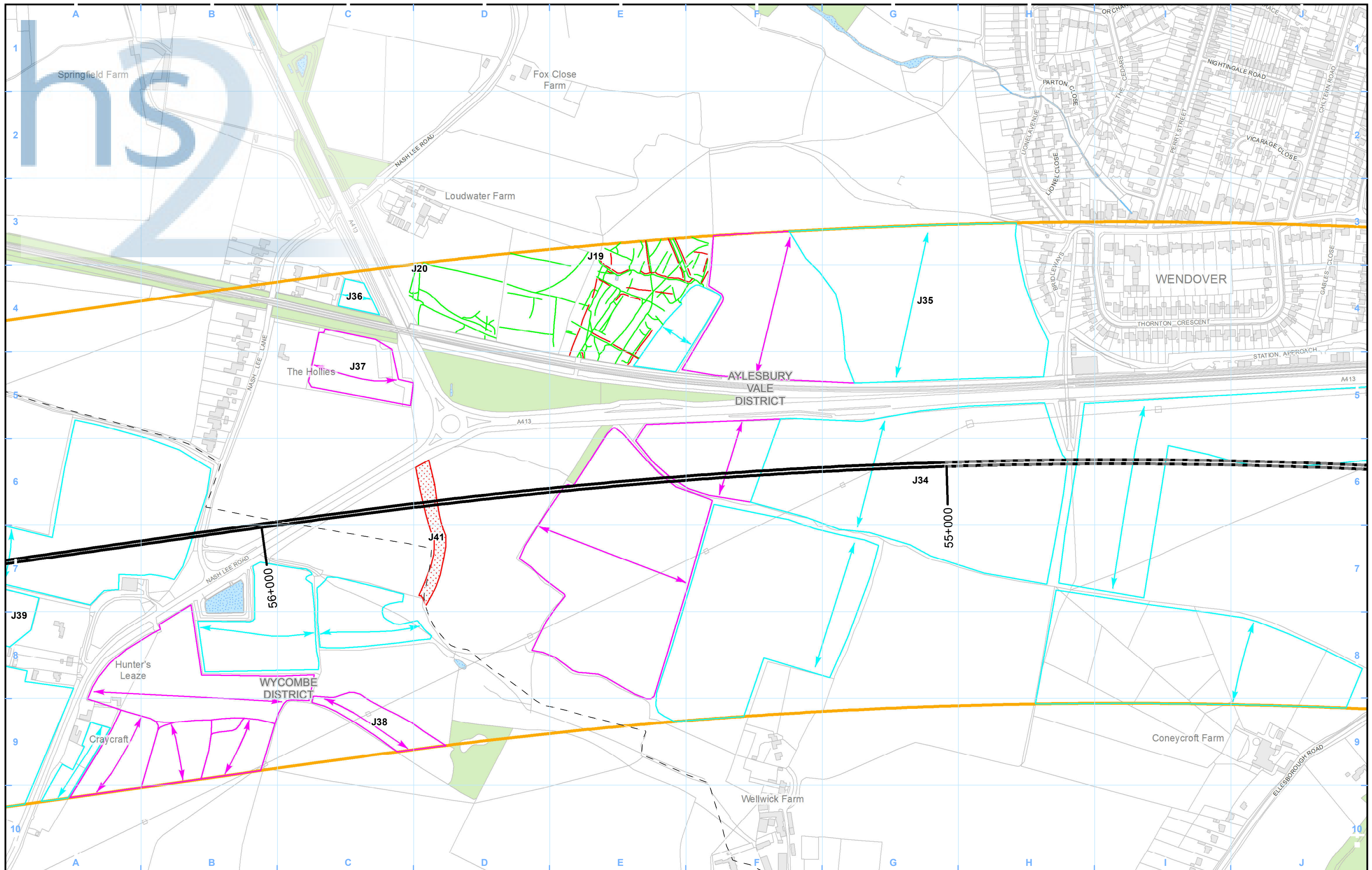
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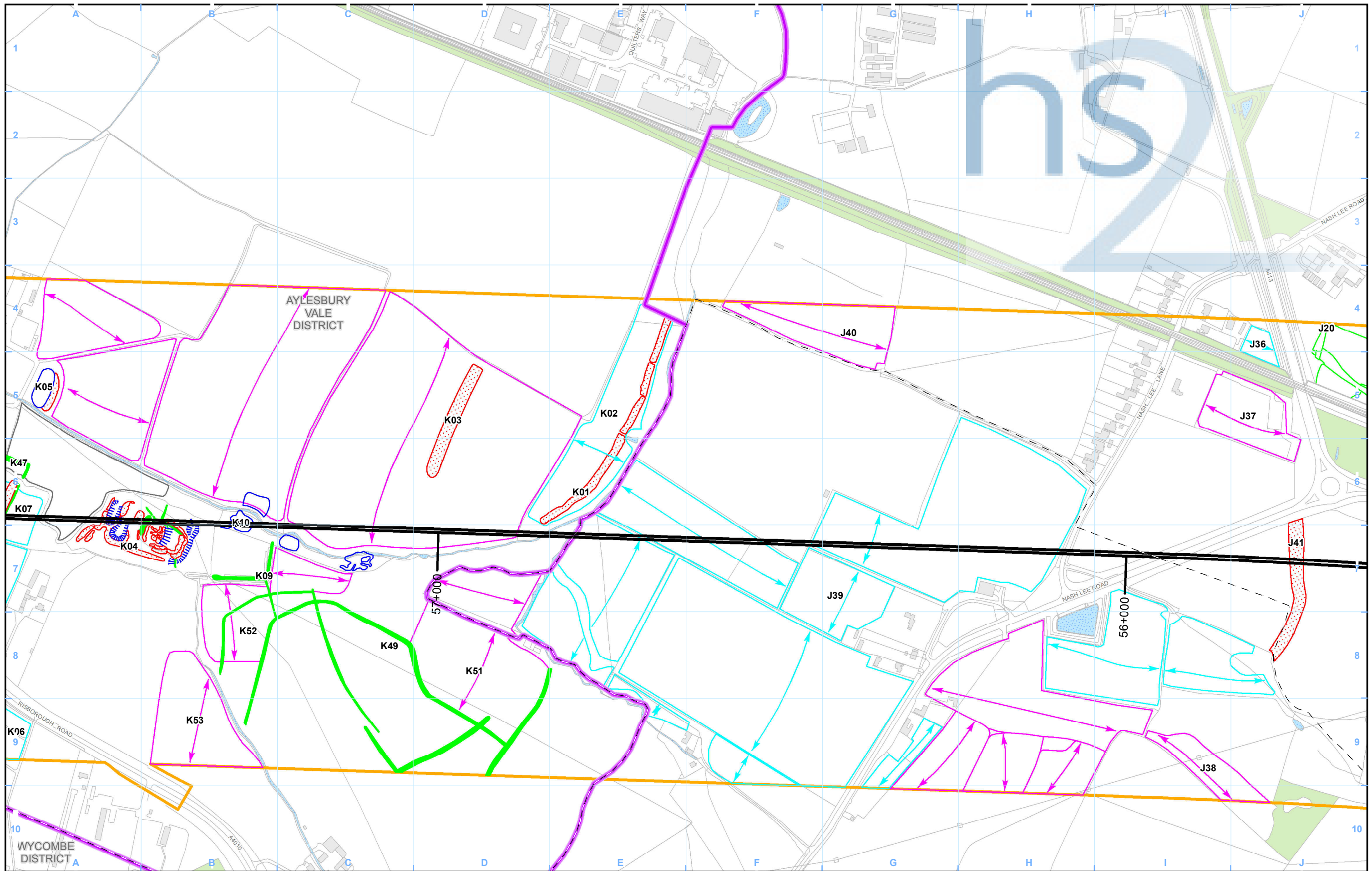
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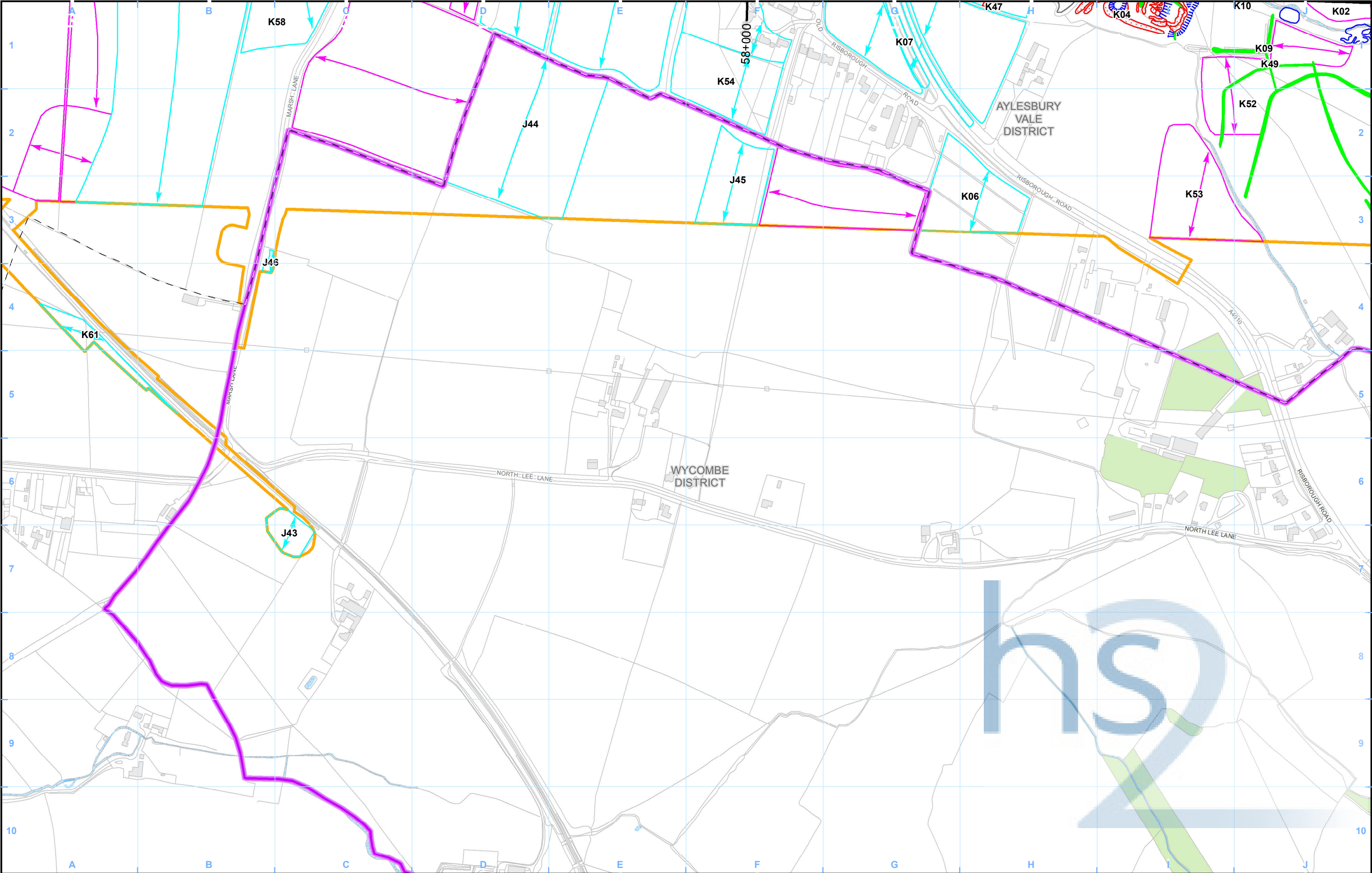
<b>Legend</b> Route in tunnel Route on surface Community forum boundary District/Borough boundary Watercourse Water body Woodland	<b>Remote sensing survey boundary</b> Archaeological features Bank Ditch Extant ridge and furrow direction Levelled ridge and furrow direction Structure T-Hachure	<b>Extent of Area</b> Bank Ditch Extant ridge and furrow outline Levelled ridge and furrow outline Structure Large cut feature	<b>Location Map</b> 	<b>Map Number</b> CH-004-10.05 <b>Map Name</b> Remote Sensing Survey Interpretation Community Forum Area CFA10: Dunsmore, Wendover & Halton	 ETM accept no responsibility for any circumstances, which arise from the reproduction of this map after alteration, amendment or abbreviation or if it is issued in part or issued incomplete in any way. Scale at A3: 1:5,000 © Crown copyright and database rights 2013. Ordnance Survey Licence Number 100049190. Doc Number: C252-ETM-EV-MAP-020-002575-P03.00 Date: 06/09/13
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<b>Legend</b> Route in tunnel Route on surface Community forum boundary District/Borough boundary Watercourse Water body Woodland	Remote sensing survey boundary <b>Archaeological features</b> Bank Ditch Extant ridge and furrow direction Levelled ridge and furrow direction Structure T-Hachure	<b>Extent of Area</b> Bank Ditch Extant ridge and furrow outline Levelled ridge and furrow outline Structure Large cut feature	<b>Location Map</b> 	Map Number <b>CH-004-10.06</b> Map Name <b>Remote Sensing Survey Interpretation</b> Community Forum Area CFA10: Dunsmore, Wendover & Halton	<div> </div> <p>ETM accept no responsibility for any circumstances, which arise from the reproduction of this map after alteration, amendment or abbreviation or if it is issued in part or issued incomplete in any way.</p> <p>Scale at A3: 1:5,000</p> <p>© Crown copyright and database rights 2013. Ordnance Survey Licence Number 100049190.</p> <p>Doc Number: C252-ETM-EV-MAP-020-002576-P03.00      Date: 06/09/13</p>
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**Legend**

Route in tunnel

Route on surface

Community forum boundary

District/Borough boundary

Watercourse

Water body

Woodland

Remote sensing survey boundary

Bank

Ditch

Extant ridge and furrow direction

Levelled ridge and furrow direction

Structure

T-Hachure

Extent of Area

Bank

Ditch

Extant ridge and furrow outline

Levelled ridge and furrow outline

Structure

Large cut feature

Map Number

CH-004-10.06a

Map Name

Remote Sensing Survey Interpretation

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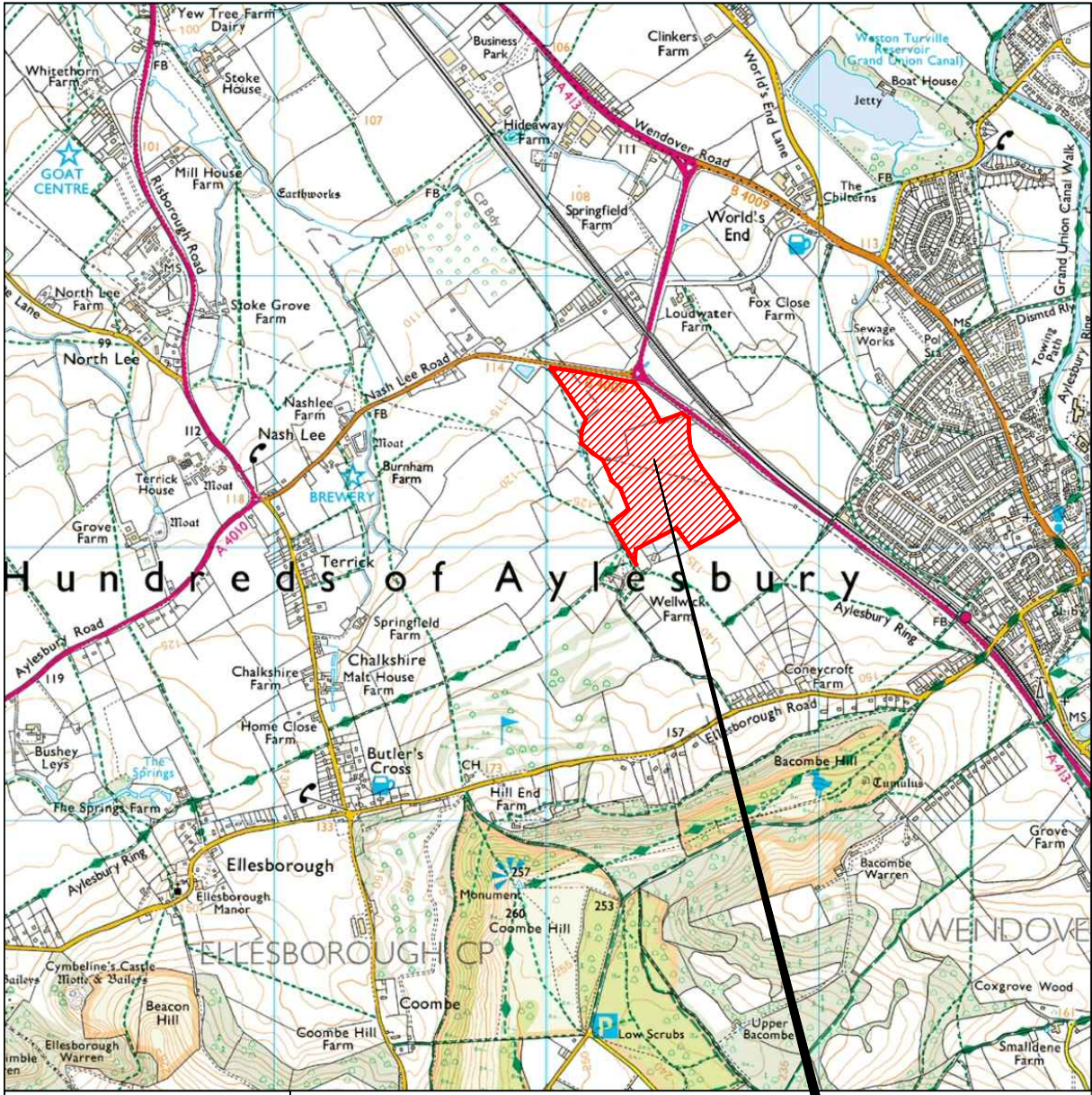
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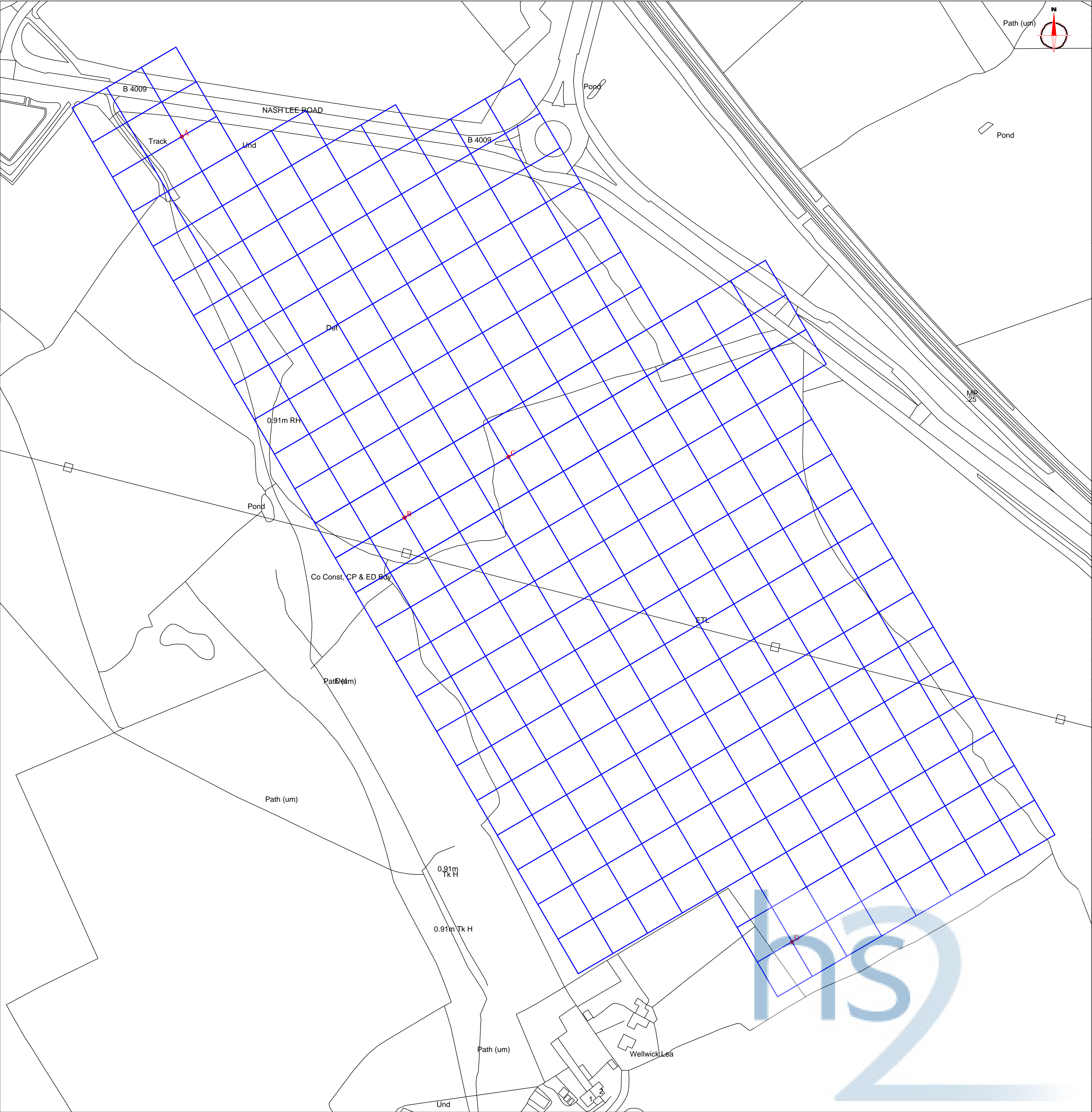
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OS 100km square = SP

Survey area



Amendments		
Issue No.	Date	Description
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Survey area

Site centred on NGR SP 854 082

OS REFERENCING INFORMATION	
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Job No. J3363 - CS0AA	Survey Date JUN 2013
Client HS2 Ltd	
Project Title GEOPHYSICAL SURVEY - HS2: LONDON - WEST MIDLANDS: CFA 10 - AREA CS0AA - WELLWICK FARM	
Subject SITE LOCATION AND SURVEY AREA & REFERENCING	

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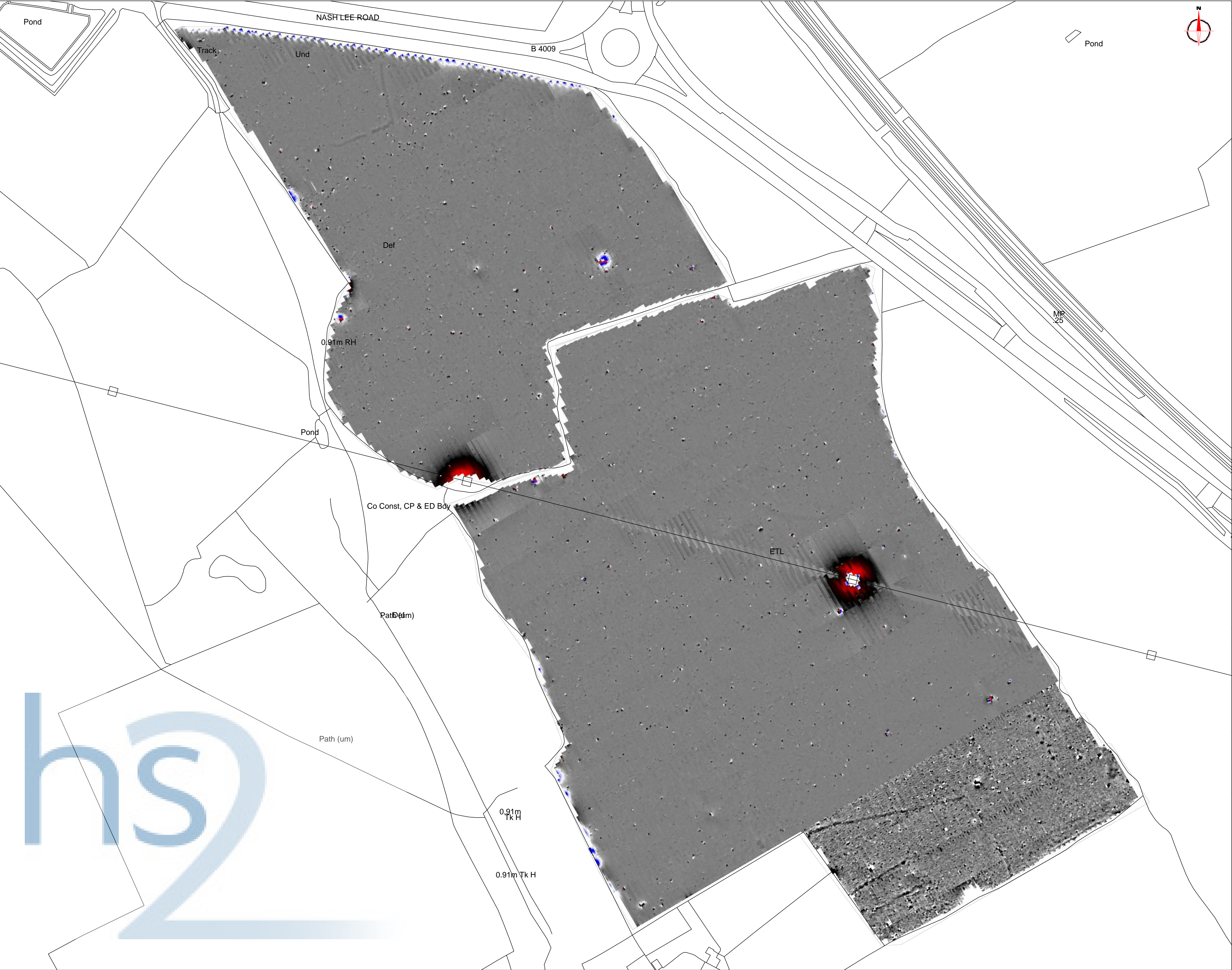
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Date JUN 2013	Drawn by BPM	Figure No. CH-004-10.07









Amendments		
Issue No.	Date	Description
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-	-	-
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Plotting parameters

Maximum + 2nT (black)  
Minimum - 2nT (white)

Zero Mean

-2nT +2nT

+2nT

-2nT

Job No. <b>J3363 - CS0AA</b>	Survey Date <b>JUN 2013</b>
Client <b>HS2 Ltd</b>	
Project Title <b>GEOPHYSICAL SURVEY - HS2: LONDON - WEST MIDLANDS: CFA 10 - AREA CS0AA - WELLWICK FARM</b>	
Subject <b>PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA</b>	

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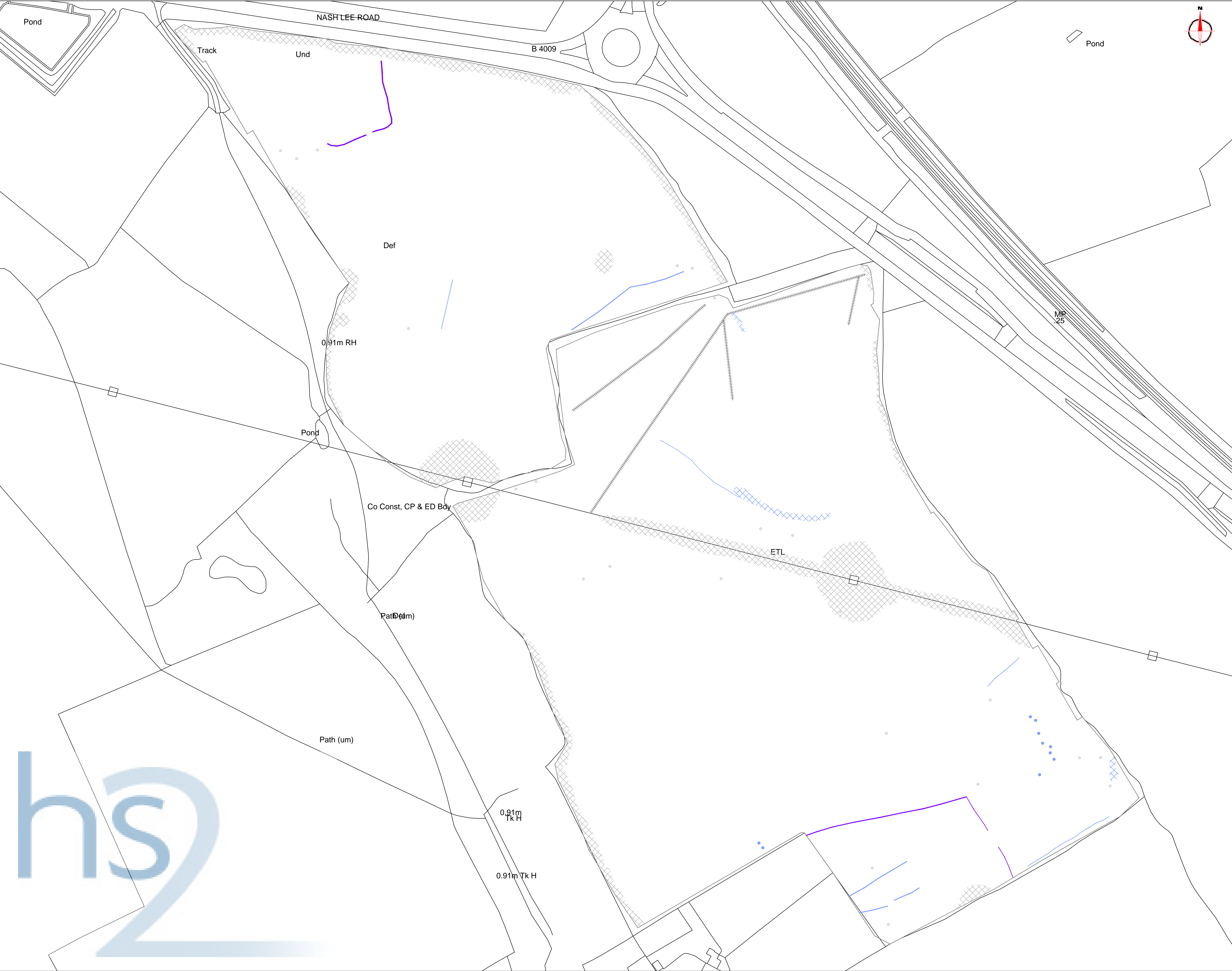
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Date <b>JUN 2013</b>	Drawn by <b>SH/BPM</b>	Figure No. <b>CH-004-10.09</b>





Amendments

Issue No.	Date	Description
-	-	-
-	-	-

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KEY

	Probable Archaeology (discrete / zone / trend*) *trend = very weak response
	Possible Archaeology (discrete / zone / trend*) *trend = very weak response
	Industrial, Burnt-Fired
	Old Field Boundary
	Agriculture - Ridge & Furrow
	Agriculture - Ploughing
	Agriculture - Drain
	Natural
	Uncertain Origin (discrete / zone / trend*) *trend = very weak response
	Pipe
	Ferrous (discrete / zone)

Job No.  
J3363 - CS0AA

Survey Date  
JUN 2013

Client  
HS2 Ltd

Project Title  
GEOPHYSICAL SURVEY - HS2:  
LONDON - WEST MIDLANDS: CFA 10  
- AREA CS0AA - WELLWICK FARM

Subject  
ABSTRACTION &  
INTERPRETATION OF  
GRADIOMETER ANOMALIES

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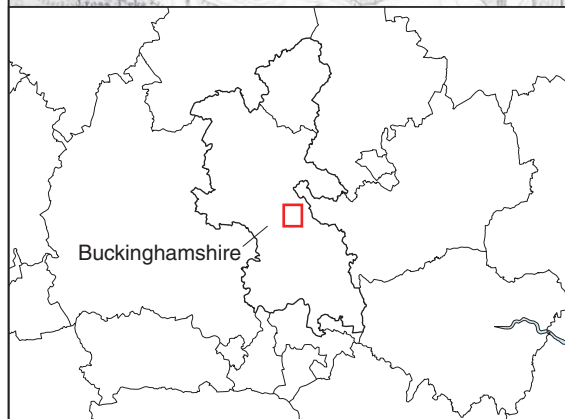
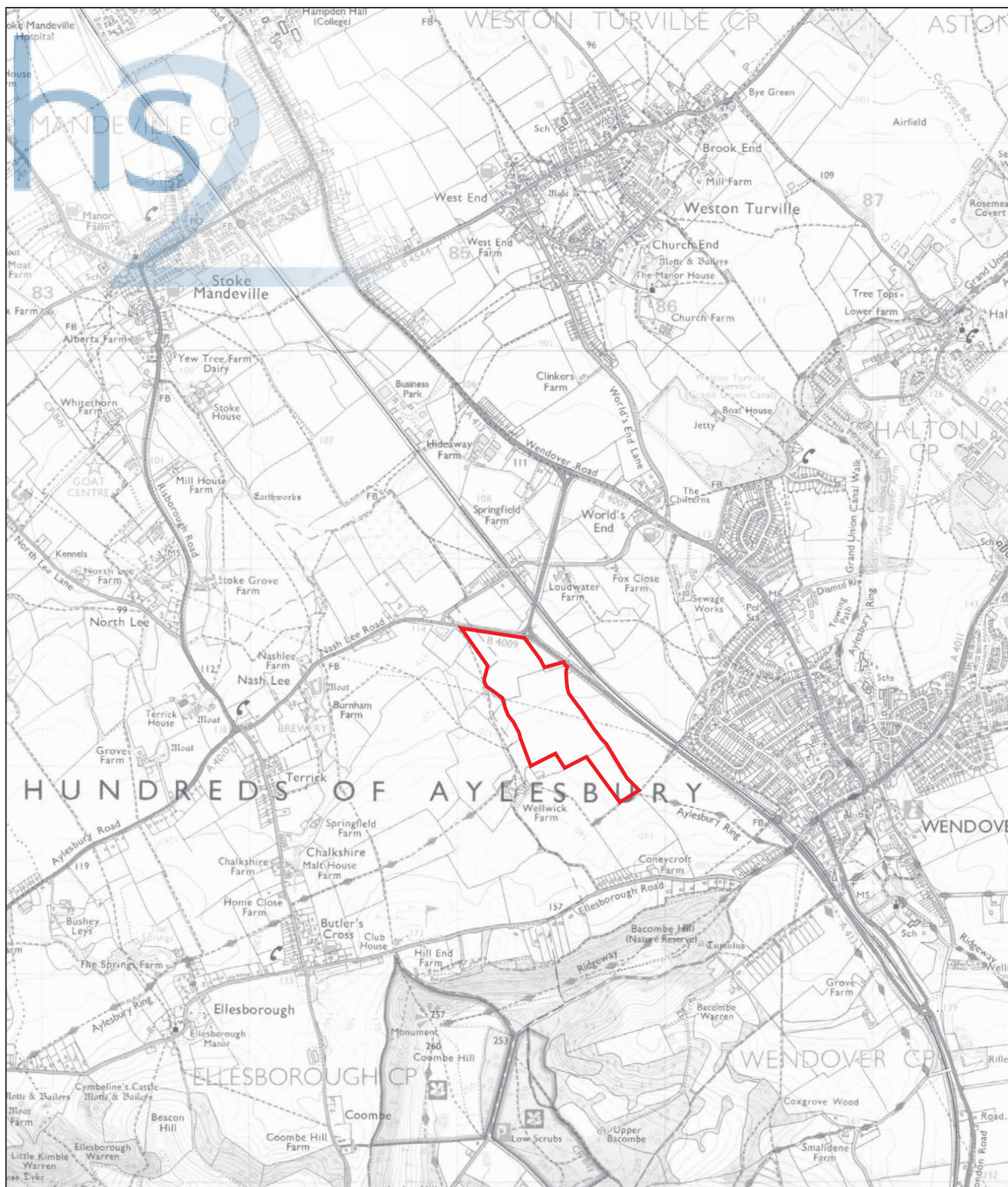
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Date JUN 2013	Drawn by BPM	Figure No. CH-004-10.10





0 1km

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**PROJECT TITLE**

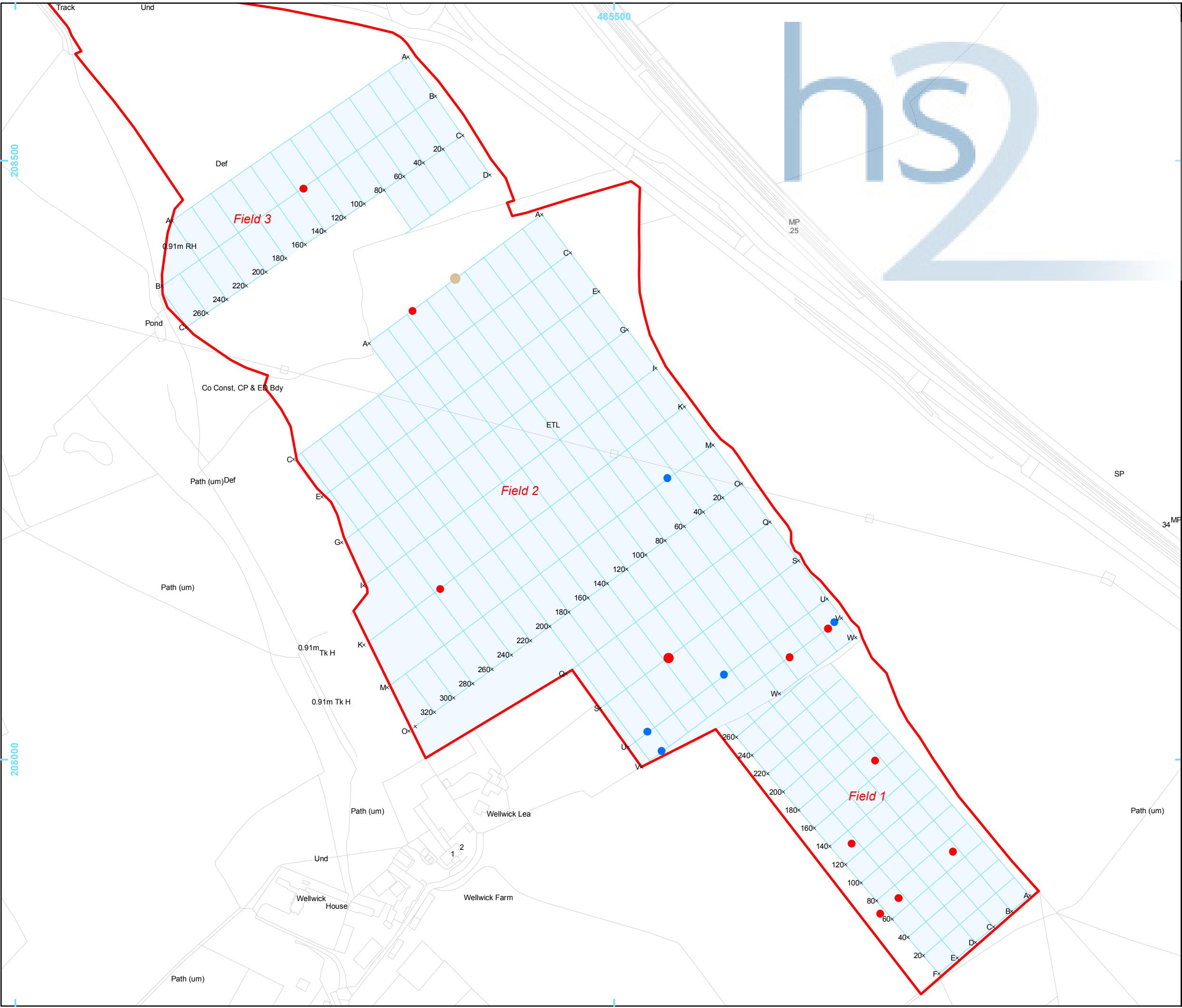
**Site CS0AA: Land near Wellwick Farm  
Buckinghamshire**

**FIGURE TITLE**

**CS0AA: Fieldwalking survey.  
Site location plan**

<b>PROJECT NO.</b> 660122	<b>DATE</b> 25-09-2013	<b>FIGURE NO.</b>
<b>DRAWN BY</b> JB	<b>REVISION</b> 00	
<b>APPROVED BY</b> PJM	<b>SCALE@A4</b> 1:25,000	<b>CH-004-10.11</b>





site

areas subject to fieldwalking

transect lines

flint tool - count

1

flint flake - count

1

2

prehistoric pottery - count

1



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PROJECT TITLE  
Site CS0AA: Land near Wellwick Farm  
Buckinghamshire

FIGURE TITLE  
CS0AA: Fieldwalking survey.  
Prehistoric finds

PROJECT NO.

660122

DRAWN BY

JB

APPROVED BY

PJM

DATE

25-09-2013

REVISION

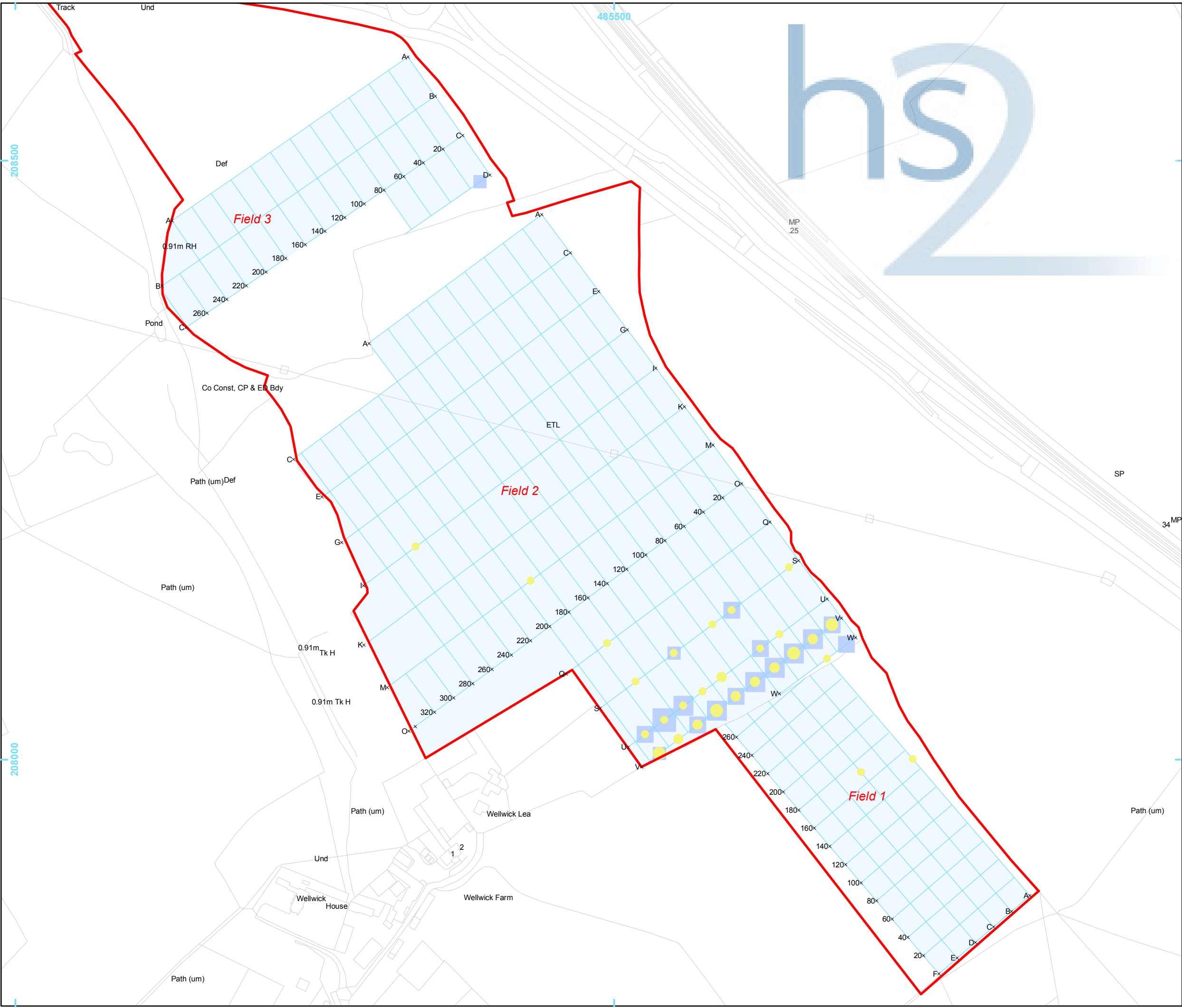
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SCALE@A3

1:3,000

FIGURE NO.

CH-004-10.12



- site
- areas subject to fieldwalking
- transect lines

Roman pottery - count

- 1 - 3
- 4 - 8
- 9 - 14

Roman cbm - weight (g)

- 2 - 6
- 7 - 88
- 89 - 165
- 166 - 301

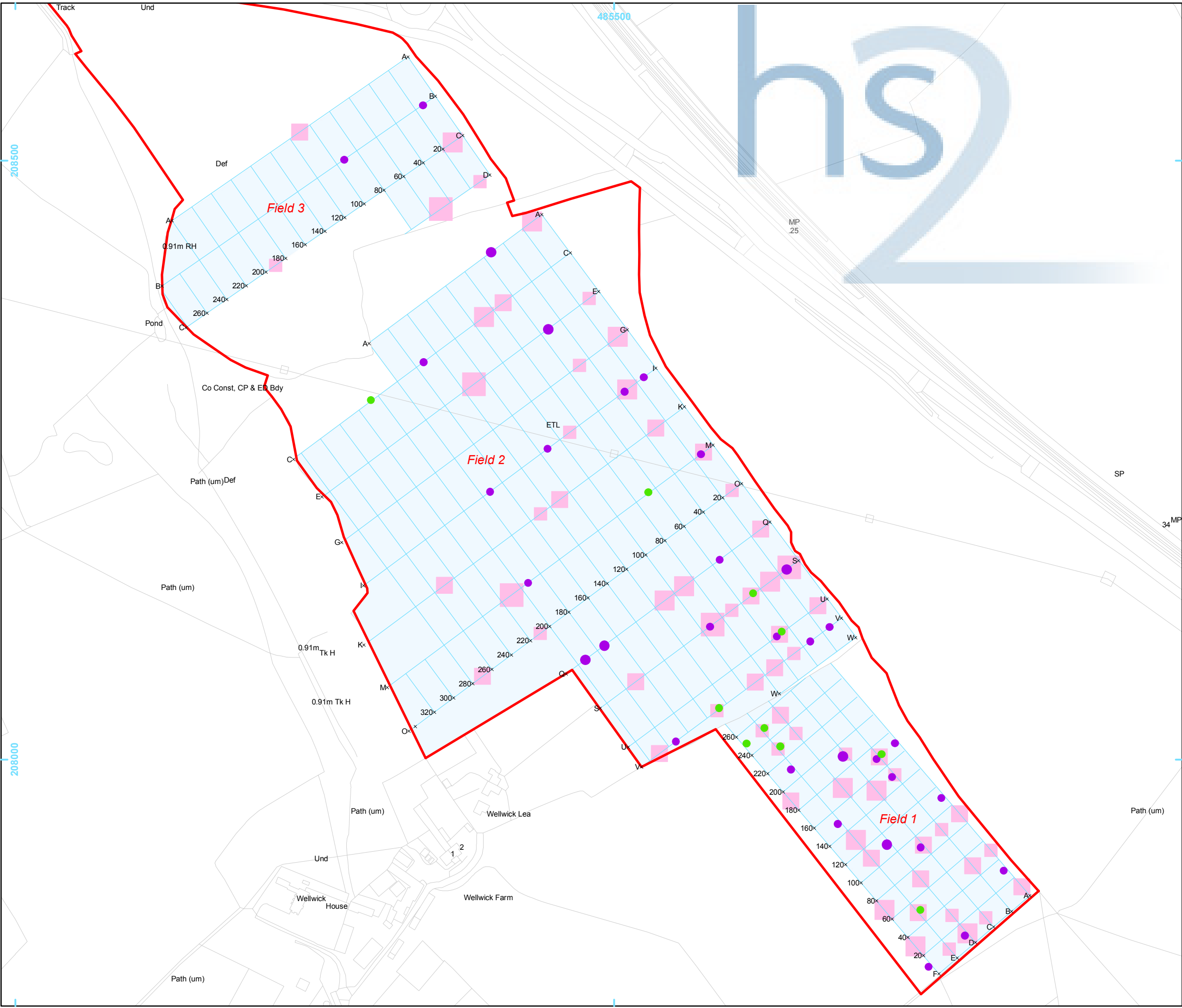


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PROJECT TITLE  
Site CS0AA: Land near Wellwick Farm  
Buckinghamshire

FIGURE TITLE  
CS0AA: Fieldwalking survey.  
Roman finds



- site
- areas subject to fieldwalking
- transect lines

medieval pottery - count

- 1

post-medieval/modern pottery - count

- 1
- 2

post-medieval/modern cbm - weight (g)

- 3 - 20
- 21 - 42
- 43 - 74
- 75 - 150



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PROJECT TITLE  
Site CS0AA: Land near Wellwick Farm  
Buckinghamshire

FIGURE TITLE  
CS0AA: Fieldwalking survey.  
Medieval and post-medieval/modern  
finds

PROJECT NO. 660122 DATE 25-09-2013 FIGURE NO.  
DRAWN BY JB REVISION 00  
APPROVED BY PJM SCALE@A3 1:3,000 CH-004-10.14